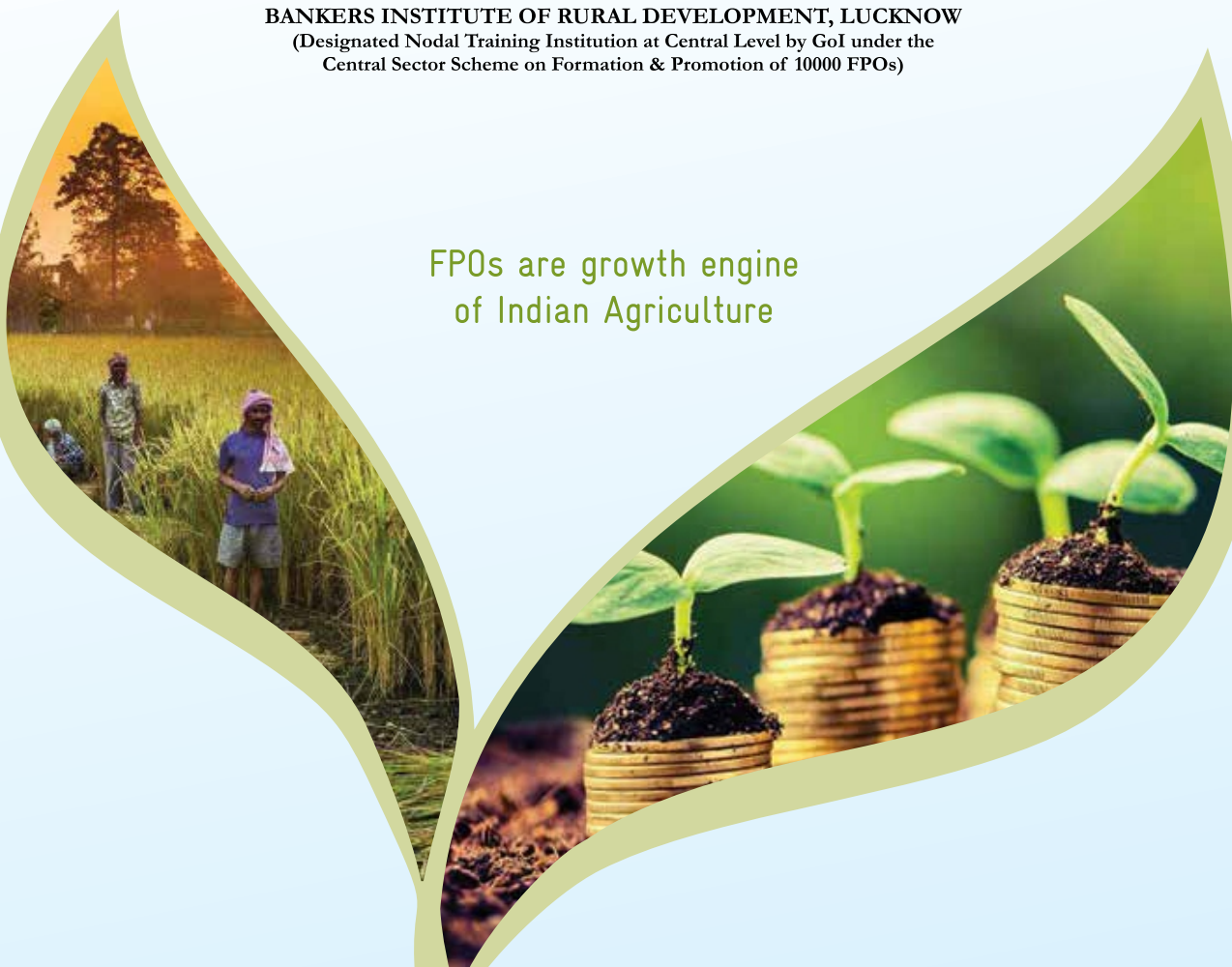




BANKERS INSTITUTE OF RURAL DEVELOPMENT, LUCKNOW
 (Designated Nodal Training Institution at Central Level by GoI under the
 Central Sector Scheme on Formation & Promotion of 10000 FPOs)

FPOs are growth engine
 of Indian Agriculture



Resource Material **Agri-Value Chain**

under
**Central Sector Scheme on Formation &
 Promotion of 10000 FPOs**



Implemented by



Advanced Module on Agri Value Chains

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INTRODUCTION

The aim of Doubling Farmers' Incomes hinges on the ability of farmers and their organisations – self-help groups, joint liability groups, cooperatives and companies – to participate in getting a farm product to the consumer – beyond just selling at the farm gate.

An agricultural value chain includes “the people and activities that bring a basic agricultural product like wheat or banana or vegetable from obtaining inputs and its production in the field to delivery to the consumer, through stages such as processing, packaging, and distribution.”

Farmer Producer Organisations are being promoted in India to enable farmers, especially small and marginal farmers – who have little bargaining power or market information. It is hoped that these FPOs will be able to intervene in many parts of a crop value chain – whether in purchasing farm inputs in bulk, simple processing, or even reaching the retail shelves with a packaged and branded product.

The Advanced Training Module on Agri Value Chains introduces the concept of Agri Value Chains, the typical value chain actors and details out the Value Chains for key cereal crops, fruit and vegetables, poultry and inland fisheries. These value chain chapters are indicative and other crops or products can also be explored by FPOs.

Chapter 1: Agri Value Chains

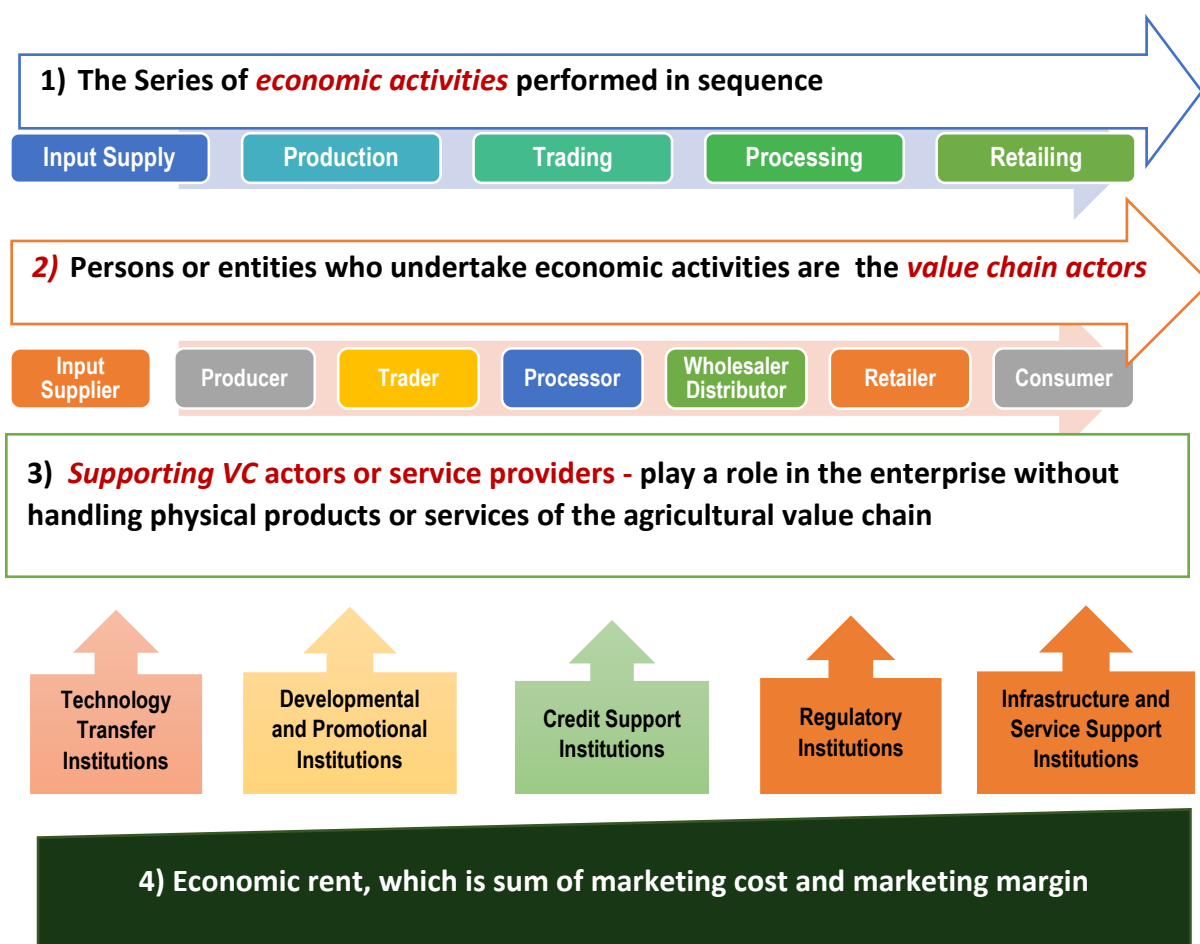
1.1 What is an Agricultural Value Chain (AVC)?

A value chain is defined as the sequence of value adding activities from production to consumption through processing and commercialization.

Definition of an agricultural value chain: “the **people** and **activities** that bring a basic agricultural product like wheat or banana or vegetable from obtaining inputs and its production in the field to delivery to the consumer, through stages such as processing, packaging, and distribution.” Value chains help increase the efficiency of the business so that it can deliver the most value for the optimally least possible cost.

1.2 Elements of an Agricultural Value Chain

The economic activities, main value chain actors, supporting value chain actors, demand and supply, flow of product, money, information and knowledge are the basic elements of the agricultural value chain.

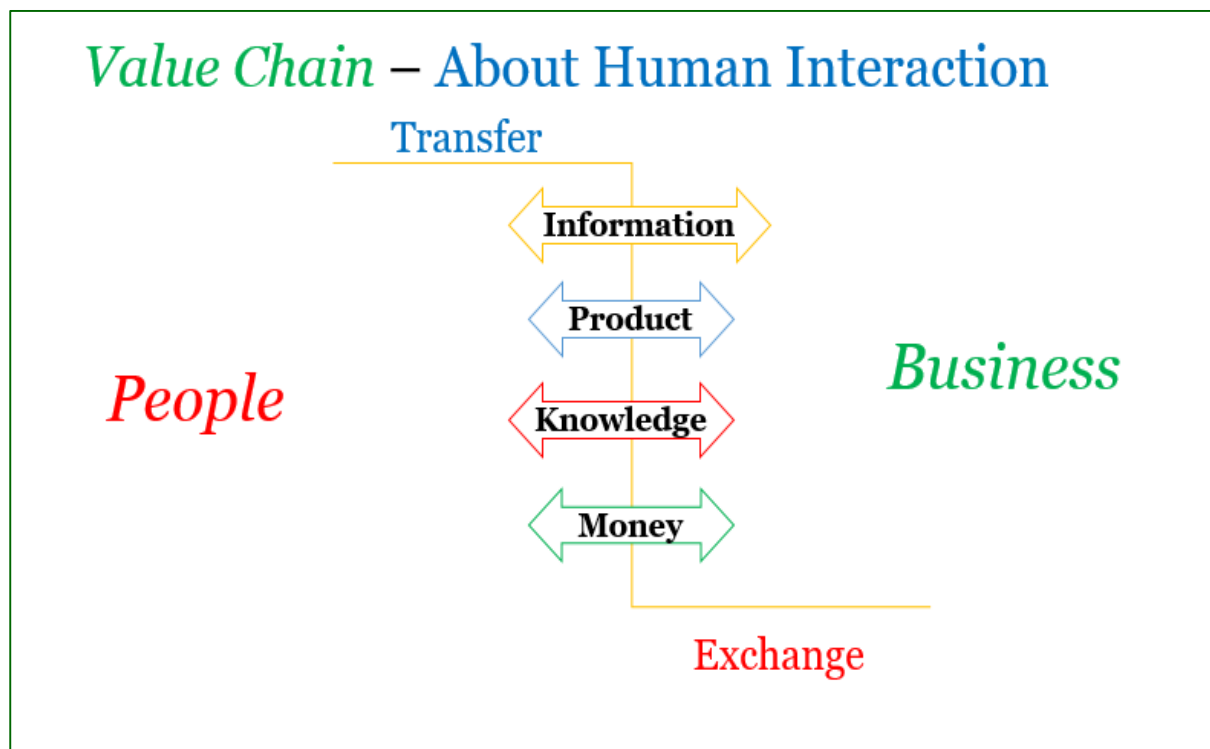


In the language of value chains, each person in the chain charges “economic rent” at his or her stage of the chain.

Value added = price received by the actor – price paid by actor

Products, money, information and knowledge are the basic elements which flow among the value chain actors and business. These elements are either transferred or exchanged among the value chain actors and business.

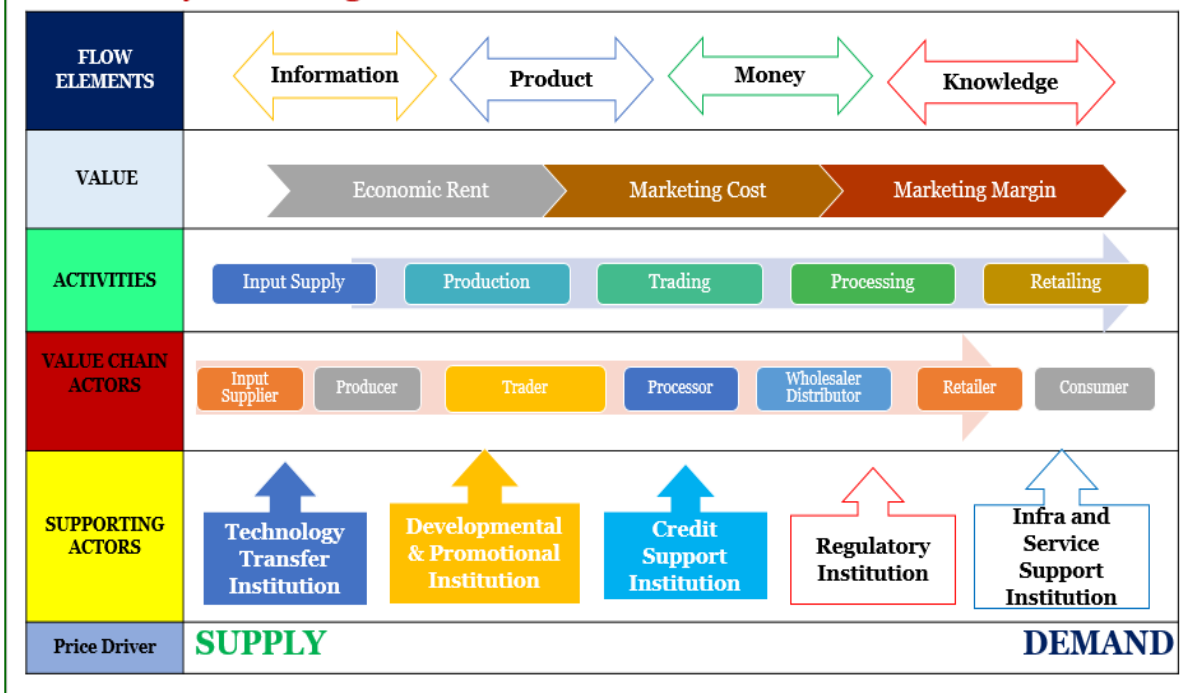
The value chain framework is made up of five primary activities – inbound operations, operations, outbound logistics, marketing and sales, service and four secondary activities – procurement and purchasing, human resource management, technological development and (company) infrastructure. In our context, the chain actors who actually transact a particular product as it moves through the value chain include input suppliers (e.g. seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers and final consumers. **The end goal of a value chain is to create a competitive advantage for the company / product by increasing productivity while optimising costs.**



1.3 Ecosystem of an Agricultural Value Chain

Now we can form a typical value chain model by mixing all the basic elements of the value chain and illustrated as ecosystem of the agri-value chain:

The Eco-system of Agricultural Value Chain

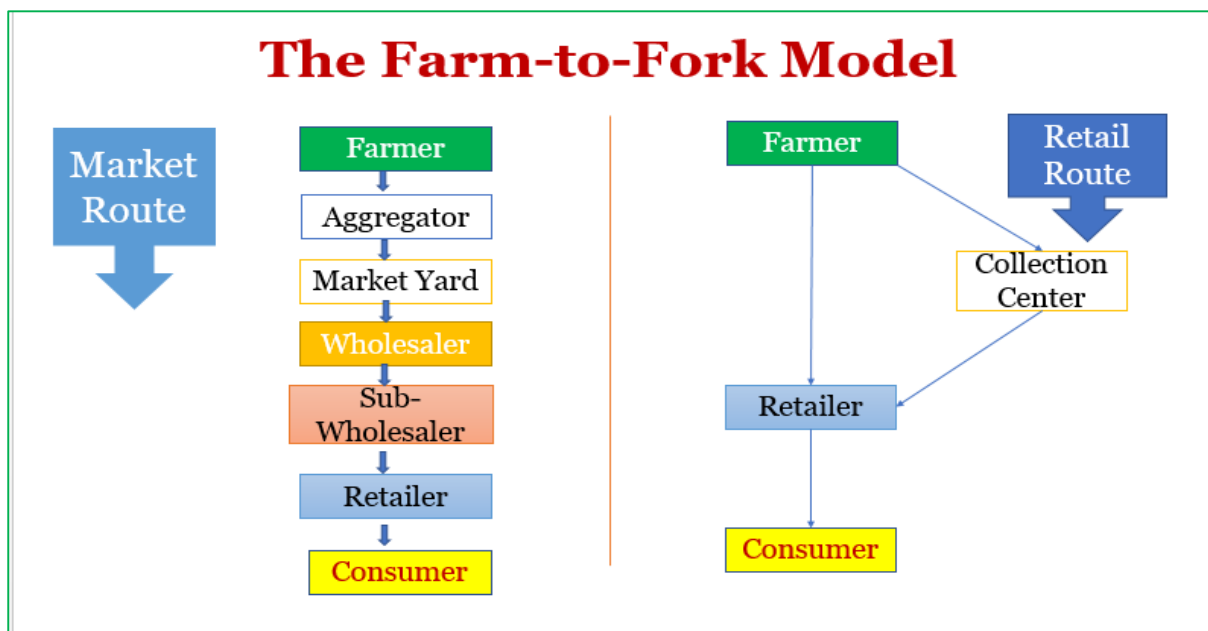


- The concept of an “Agri Value chain” includes the full range of activities and value chain actors involved in moving products.
- Moving of products from the input supplier to the farmers’ field, and ultimately, to the consumers’ table.
- Each stakeholder or process in the chain has a link to the next in order for the processes to form a viable chain.
- At each stage, some additional transformation or enhancement is made to the product.
- Additional transformation or enhancement may range from simply moving the products from point “x” to point “y” (a common value addition for aggregator for example) to complex processing and packaging.
- Each segment of a chain has one or more backward and forward linkages.
- A chain is only strong as its weakest link and hence the stronger the links, the more secure the flow of products and services within the chain.
- A value chain is not an entire sector or subsector – but a part of it.
- It involves a specific group of interrelated producers and other actors who supply a **particular end market**.
- The relationship between buyers and sellers can be described through various types of linkages along a continuum:
 - **An instant or spot market**, where producers come to sell their commodities and where prices fluctuate; this is the most risky in terms of setting a market price;
 - A contract to produce and buy, known more generally as **contract farming**;

- A long-term, often informal, relationship characterized by trust or inter dependency;
- A capital investment by one of the buyers for the benefit of the producer, characterized by high levels of producer credibility and dependence; and
- Full vertical integration (from inputs to final consumer product handled by a single organisation)

1.4 Issue of fragmented production system and market relationship

Except the producer, all other value chain actors are almost organised. As regards the producer, an informal and fragmented connectivity with the markets has led to low bargaining power, low price realization and even manipulated pricing.



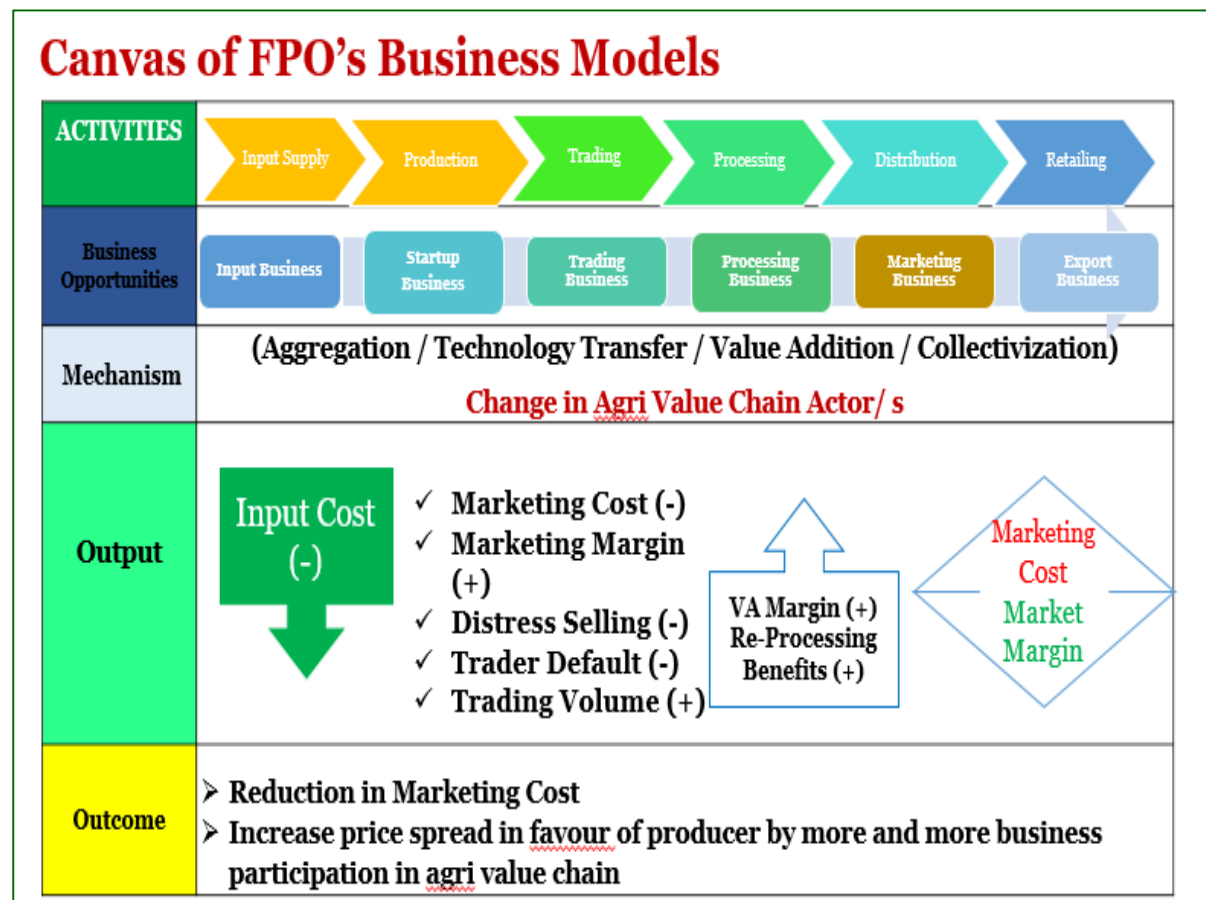
1.5 Integration of economic activities and value chain actors

- Agriculture has been changing rapidly from one of fragmented production and marketing relationships toward integrated market systems or chains.
- Driven by gains from economies of scale and globalization of the food chain, multinational agri-enterprises increasingly dominate the sector with more and more vertical and horizontal linkages or integration.
- The changes are also being driven by the marketplace and responsiveness to consumer interests, including stricter compliance, timeliness and quality standards.

1.6 Developing AVCs for enhancing economic rent of producer

The strategy for developing or strengthening value chains depends on the business model. The term “business model” in value chains refers to the way value is added within a network

of producers, suppliers and consumers. The business model includes the drivers, processes and resources of the entire value chain system, even if the system is composed of multiple enterprises.



Enhancement of “economic rent” may be possible through the enhanced participation in business of the producer in the aggregation and collectivization of the individual resources, production and marketing in a given institutional framework. One or multiple approaches of aggregation, depending upon the available resources, potential and prospects and enabling environment, can be undertaken by a farmer producer organization (FPO) which are as under:

1. Participation to fulfil the technological gap
2. Business participation in input management (Aggregation of Inputs)
3. Business participation in Primary / secondary processing (Value Addition)
4. Business participation in marketing (Collective Marketing)
 - Business participation in trading business during the lean period of the agricultural operation of the concerned members of the FPO's

Developing an agricultural value chain is also entrepreneurship!!

Chapter 2: Agri Value Chain Actors

2.1 Introduction

An FPO cannot participate in business or have a commercial orientation unless it enters the agri-value chain as a lead actor; the entry facilitates collective economic activity and enhances scale of economy. However, before the FPO enters as a value chain actor in the prevailing agri value chain it is important to understand the business model/s of the different value chain actors in terms of the value chain characteristics.

The major functions performed by the actors along the Agri value chain are:

- | | |
|---|-------------------------------|
| 1. Collection and assembling | 1. Transportation |
| 2. Cleaning, Grading, sorting and standardization | 2. Processing |
| 3. Storage | 3. Wholesaling and Retailing. |

These functions are performed by itinerant village merchants, commission agents, wholesalers, transport operators, storage operators, weighmen, processors, wholesalers and retailers. The actors / intermediaries performing these functions also seek returns commensurate with their investments.

Table 2.1 Category of Marketing functions

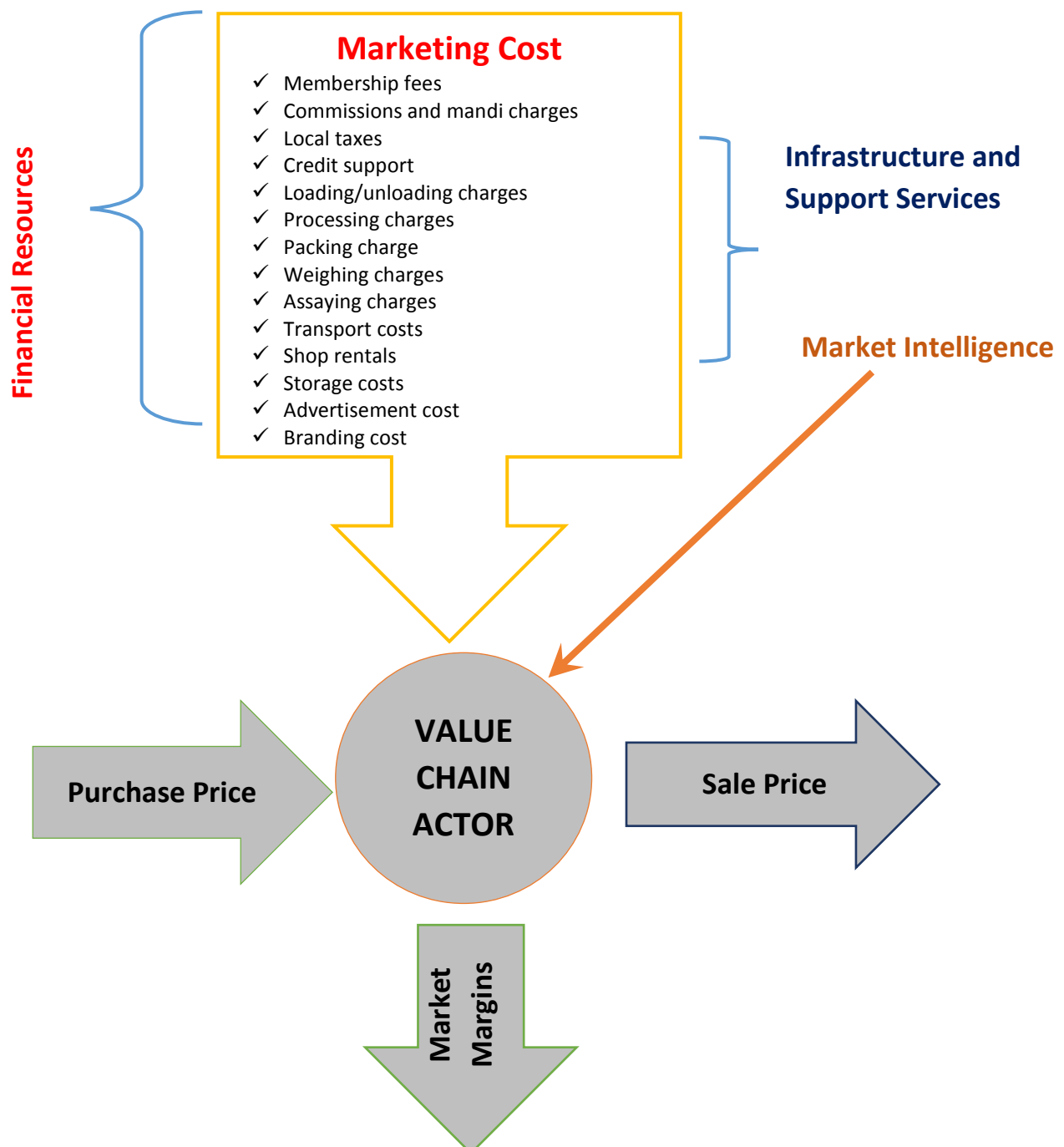
I. Exchange Functions	1. Buying
	2. Selling
	3. Storage
II. Physical Functions	4. Transportation
	5. Processing
	6. Standardisation
III. Facilitating Functions	7. Financing
	8. Risk Bearing
	9. Market Intelligence

Table 2.3 Conflict of interest in agricultural/food marketing systems

Key Players	Interest
Farmers	Maximum price, unlimited quantities
Manufacturers / Processor	Low purchase price, high quality
Traders and retailers	Low purchase price, high quality
Consumers	Low purchase price, high quality

The farmer's interest is focused on getting the best return from his produce, which usually equates to maximum price for unlimited quantities. Manufacturers / processors would normally prefer the least cost and best quality produce from the farmer so that they can sell it at competitive, but profitable, prices. Traders and retailers would prefer high quality and reliable supplies from the manufacturer / processor or farmer, at the most competitive prices. Consumers are of course interested in obtaining high quality products at affordable prices. Clearly, there are conflicting interests here.

Fig 2.1: The Eco-system of the value chain actor



2.2 Role and functions of market intermediaries in agricultural marketing

A. Input Suppliers

Input suppliers specialize in distributing genetic materials, fertilizers, micronutrients, plant protections inputs (*Herbicides, Fungicides, insecticides*), feed, medicines used to produce crops or livestock, specially, seeds or breeding stock that are used to produce the main agricultural products. This is, essentially, the stage before farming. There is often significant research and development involved in producing what is called seed stock. In agriculture, input suppliers can be private enterprises.

VC actor	Main Feature	Required Financial Services
Input suppliers	• Input management (Inputs, technical services) • vary in size • Different and individualized financial needs.	• Short-term working capital • Mid-term financing (equipment dealers) • Payment, Transfer Systems • Insurance, frequent term loans with flexible terms

B. Primary Producers

Unlike most other producers of goods, primary producers are unique in that their businesses are generally tied to the land or other natural resources. Primary producers can be family farms, farmer groups, farmer cooperatives, smallholder farmers, and large corporate enterprises. Fishermen are also considered to be primary producers. This stage involves the use of the supplied inputs coupled with other natural resources to produce a desired raw material or finished products.

VC actors	Main Feature	Required Financial Services
Producers/ farmers	• Primary production • Engaging families and seasonal/part-time workers. Associated significant risks	• Short-term working capital • Mid-term financing (equipment, livestock) • Deposit accounts (value storage, commitment savings) • Payment, Transfer Systems • Insurance, frequent term loans with flexible terms

C. Primary Trader / Post Harvest Contractor / Local Aggregator

- They move from village to village, and directly purchase the produce from the cultivators.
- They transport it to the nearby primary or secondary market and sell it there.
- They may have their small establishments in villages.

- They purchase the produce of those farmers who have either taken finance from them or those who are not able to go to the market.
- Also supply essential consumption goods to the farmers.
- Often visit nearby markets and keep in touch with the prevailing prices.
 - They either sell the collected produce in the nearby market or retain it for sale at a later date in the village itself.

D. Wholesalers

Wholesalers add value in that they may perform activities such as aggregation, distribution and storage, and minor post-harvest activities. These activities may help to differentiate quality levels through sorting, cleaning, grading, and sometimes even minor packaging.

- They buy and sell food grains in large quantities.
- May buy either directly from farmers or from other wholesalers.
- Sell food grains either in the same market or in other markets.
- Sell to retailers, other wholesalers and processors.
- Do not sell significant quantities to ultimate consumers
- Own warehouses for the storage of the produce.
- They assemble the goods from various localities and areas to meet the demands of buyers.
- They sort out the goods in different lots according to their quality and prepare them for the market
- They harmonise the flow of goods / produce by storing them in the peak arrival season and releasing them in the off-season
- They regulate the flow of goods by trading with buyers and sellers in various markets
- They finance the farmers so that the latter may meet their requirements of production inputs
- They assess the demand of prospective buyers and processors from time to time, and plan the movement of the goods over space and time.

VC actors	Main Feature	Required Financial Services
Aggregators, service providers, traders	• Buy the produce and enhance the lot size before selling • Success hinges on making their working capital flow as quickly as possible in buying and reselling produce. • Every transaction offers an opportunity to make a profit (or incur a loss). • Small rural traders stop buying when they run out of cash, leaving farmers stranded with their produce.	• Short-term working capital • Mid-term financing (storage facilities, vehicles) • Deposit accounts (checking) • Payment, Transfer Systems • Insurance, frequent term loans with flexible terms

E. Small Retailers

- Buy goods from wholesalers and sell them to the consumers in small quantities. Producers' personal representatives to consumers
- Closest to consumers in the marketing channel

F. Big retailers or small wholesaler

- Earlier, used to deal only in one or two types of fruits and vegetables
- Usually sell to the bulk consumers like hotels, small retailers and vendors in lots of around 5-10 kg each
- Now they have evolved more like ordinary retailers.

G. Agent Middlemen

- Act as representatives of their clients.
- They do not take title to the produce and, therefore, do not own it.
- They merely negotiate the purchase and/or sale.
- They sell services to their principals and not the goods or commodities.
- They receive income in the form of commission or brokerage.

H. Two types: Commission Agents or Arhatias or Brokers

- *Commission agents*: A person operating in the wholesale market who acts as the representative of either a seller or a buyer. His profile encompasses physical handling of the produce, arranging for its sale, collects the price from the buyer, deducts his expenses and commission, and remits the balance to the seller.
- *Kaccha Arhatias* (Unregulated market): Primarily act for the sellers, including farmers. Sometimes provide advance money to farmers and itinerant traders on the condition that the produce will be disposed of through them. Charge arhat in addition to the normal rate of interest on the money they advance.
- *Pacca Arhatias* (Unregulated market): Acts on behalf of the traders in the consuming market. Processors and big wholesalers in the consuming markets employ pacca arhatias as their agents for the purchase of a specified quantity of goods within a given price range.
- *A Class Trader* ((Regulated market): Keeps an establishment – a shop, a godown and at times a rest house for his clients. Normally preferred by the farmers to the co-operative marketing society for selling their produce

Functions of a Commission agent

- Advances 40-50% of the expected value of the crop as a loan to farmers to enable them to meet their production expenses

- They retain the sale proceeds, and pay to the farmers as and when the latter require the money. Offer advice to farmers for purchase of inputs and sale of products
- Provides empty bags to enable the farmers to bring their produce to the market
- Provides food and accommodation to the farmers and their animals when the latter come to the market for the sale of their produce
- Provides storage facility and advance loans against the stored product up to 75% of its value. Arranges, if required by the farmer, for the transportation of the produce from the village to the market
- Helps the farmers in times of personal difficulties.

Farmers unload their produce on to a particular platform of a **commission agent (arhatiya)**. A commission agent is a licensed dealer, authorized by the local market committee and acts as an agent of the farmer. He is responsible for the display of the crop, its basic cleaning and sorting, conducting auction and payment to farmers. As an agent, he does no trading of his own and his income is the commission as fixed by the APMC. It is paid by the buyer. Generally, arhatiyas maintain long-term relationships with 50-100 farmers' families, who form the core of their business. Some arhatiyas also lend to farmers. The principal and interest are typically adjusted against the payment due to farmers. On the other hand, by aggregating agri produce and facilitating concentrated purchases, the arhatiya saves the buyers the hassle of dealing individually with several farmers.

Brokers

- Render personal services to their clients in the market
- Unlike the commission agents, they do not have physical control of the product
- Main function: bring together buyers and sellers on the same platform for negotiations.
- Their charge is called "brokerage"
- Renders valuable service to the prospective buyers and sellers, for they have complete knowledge of the market – of the quantity available and the prevailing prices.
- Have no establishment in the market.

Speculative Middlemen

- Takes title to the product with a view to making a profit on it
- Not regular buyers or sellers of produce
- Specialized in risk – taking
- Aims to buy produce at low prices when arrivals are substantial and sell in the off – season when prices are high.
- Does minimum handling of goods

- Makes profit from short-run as well as long-run price fluctuations.

VC actors	Main Feature	Requisite Financial Services
Retailers, wholesalers Exporters	• Sell the processed product to local and global retailers, supermarkets, and smaller storefront retailers • Manage credit relations in two directions • Act as a de facto bank for other actors in the chain. • They often need more capital than other traders in the value chain.	• Short-term working capital • Mid-term financing (equipment) • Deposit accounts (checking) • Payments, transfer systems

I. Processors

- Carry on their business either on their own or on a custom basis
- Some processors employ agents to buy for them in the producing areas, store the produce and process it throughout the year on a continuous basis.
- Engage in advertising activity to create a demand for their processed products.

VC actors	Main Feature	Requisite Financial Services
Processor	• Value addition • Lack the WC for small unit • Buy products in bulk • Often lack the money to invest in equipment • Lower quality and higher processing costs can cause losses	• Short-term working capital • Mid-term financing (equipment) • Deposit accounts (checking) • Payments, transfers systems

J. Facilitative Middleman

- Does not buy and sell directly but assists in the marketing process.
- Marketing can take place even if they are not active
- Efficiency of the system increases when they engage in business
- Receives their income in the form of fees or service charges from those who use their services.

K. Graders

- Sorts out the product into different grades, based on some defined characteristics, and arrange them for sale
- Facilitates the process of settlement of prices between the buyer and the seller

L. Transporters

- Assists in the movement of the produce from one market to another market.
- Main transport means are trains and trucks.

M. Communication agency

- Helps in the communication of the information about the prices prevailing, and quantity available, in the market
- The post and telegraph, telephone, newspapers, the radio, Television, Internet and informal links are the main communication channels in agricultural marketing.

It is pertinent to note that for actors to participate in the agricultural value chain, there is a margin of profit / surplus expected for whatever service he/she renders. These actors directly or indirectly influence the price of the products before it gets to the intended consumer.

2.3 Importance of Value Chain Actor's Dynamics for FPO

To harness maximum economic rent through the long, ineffective and inefficient agri-value chain, it is necessary to increase economies of scale by participating as a producer in the chain. Hence, before undertaking the vertical upgradation of the prevailing agri-value chain, knowledge of value chain dynamics in terms of the business model of the value chain actors is a prerequisite. This will give the following vital information for decision making:

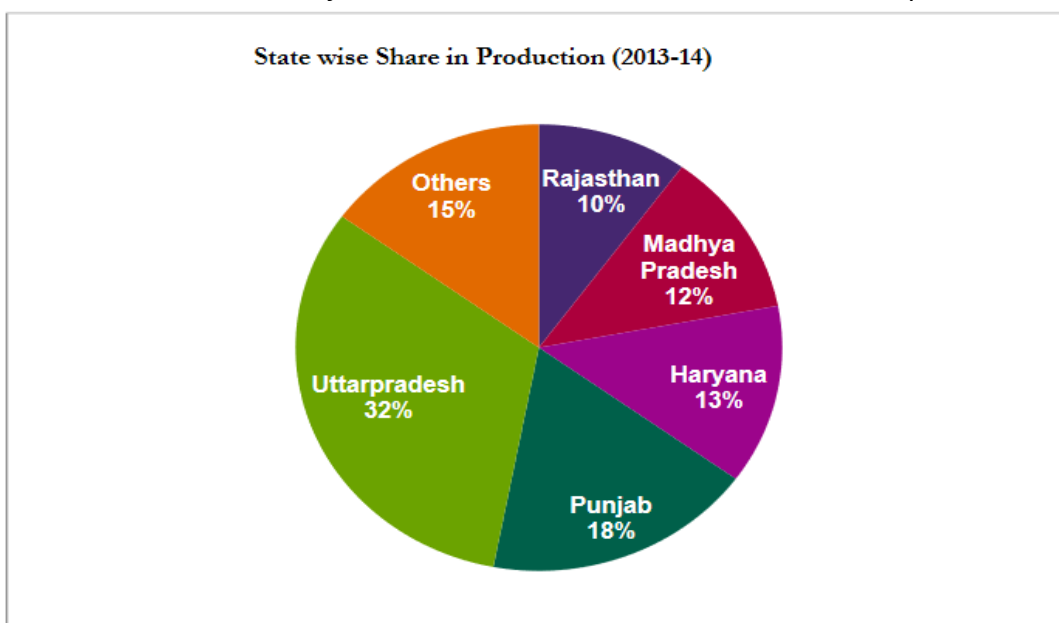
- *Financial resources required* to perform the necessary business activity of the particular value chain actor.
- *Assessment of infrastructure and support services* required for loading / unloading, processing, packing, weighing, assaying, transport, establishment of shop and storage.
- *Assessment of the economic rent / mark-ups (Marketing cost and Marketing Margin)* to analyse technical feasibility and economic viability of the prioritised business activity.
- *Networking / business relationship mechanism* with input and output value chain actors to perform a business activity.
- *Assessment of market dynamics / market intelligence* (variation in demand, price, segment, quality, etc.) in correlation with the business activity.
- *Assessment of extent of operation and market risk* involved in a particular business activity and how the value chain actor / business undertaking can overcome it by an appropriate mitigation strategy.

Chapter 3: Wheat

The Agricultural Value Chain Crop

3.1 Introduction

- India is the second largest producer of wheat in the world after China and accounts for 8.7 per cent of the world's total wheat production.
- India's share in the world for the area under wheat cultivation is about 12.4%.
- Nearly 85% of the total wheat production comes from 5 states - Uttar Pradesh, Punjab, Haryana, Madhya Pradesh and Rajasthan.
- India's wheat production has increased in last 10 years at CAGR of 2.46%.
- Uttar Pradesh is the largest producer of wheat contributing for about 32%. Punjab accounting for about 18% followed by Haryana for about 13%, Madhya Pradesh for about 12% and Rajasthan for about 10% of the total wheat output in the country.



Source: Ministry of Agriculture, GoI

3.2 Input Management and Production System

- Lack of knowledge of wheat production technologies among the local farmers.
- Producers also face the non-availability of improved and good quality seed in some regions.
- There is a lack of sufficient irrigation at critical stages of growth which adversely impacts yield.
- Wheat crop is likely to lose the ground to other high value crops (horticultural and plantation crops) and non-agricultural use of land in future.

- Irrigated agricultural lands under the rice-wheat cropping system are the prime target for high-value agriculture.
- The wheat growing areas in the northwest India are also facing the problem of declining water table and soil salinity. Hence area under wheat cultivation is likely to decline in north India
- The yields in large irrigated growing areas of the north (Punjab, Haryana and Western U.P.) are above 4.5 tons per hectare.
- Yields in the central and western states (Gujarat, Madhya Pradesh, Rajasthan, Bihar and most of Uttar Pradesh) are relatively low (1.5-2.8 tons per hectare) due to lack of assured irrigation facilities and the low use of inputs.

3.3 Post-Harvest Management

- It is estimated that the total post-harvest losses are around 5% -9% of the storage, handling and the transportation of wheat at every stakeholder' point.
- There is also the non-availability of scientific storage facilities or silos near the production centres for storing round the year

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
		Harvesting							Sowing		

3.4 Value addition - Processing

- Obsolete techniques are being used in processing, which reduces output.
- Inadequate sorting, grading facility near production site fetches a lesser price for farmers.
- There are sizeable post-harvest losses due to in-efficient storage practices.

3.5 Marketing

- The marketed surplus of wheat has been estimated to be about 40 to 50 per cent of production.

Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Harvesting		Peak Period						Lean Period			

- At the post-harvest stage, the prices tend to decline as harvesting progress and produce starts flowing into the market.
- The procurement is mostly controlled by large players apart from State governments.
- The producers market their produce both through local traders and APMC Commission agents largely.

- Much of the value accrues largely to the processors and retailers.
- Due to limited infrastructure facilities available to various stakeholders, marketing efficiency is adversely affected.
- Inadequate infrastructure/ facilities with producers, traders, millers and at the market level also cause marketing inefficiencies.
- The large number of intermediaries in the chain leads to low income to the producer (farmers).
- Fluctuations in supply (based on production), coupled with export-import dynamics, make prices of wheat unstable.

3.6 EXPORT

- India's share in global exports was around 0.40 percent in the year 2015-16.
- The demand of India's wheat in the world shows a rising trend.
- The country has exported 618020.01 MT of wheat to the world at a value of Rs. 978.59 crores during the year of 2015-16.
- However, sometimes India's export have dipped on account of surplus global stocks and higher domestic prices
- India exports the most to Bangladesh, followed by Nepal and UAE

Table 3: Trends in world wheat demand and supply (million tons)

Year	Production	Imports	Exports	Consumption	Stocks
2010-11	651	132	133	653	198
2011-12	696	149	158	688	197
2012-13	658	144	137	686	176
2013-14	714	157	166	694	186
2014-15P	720	153	155	708	196

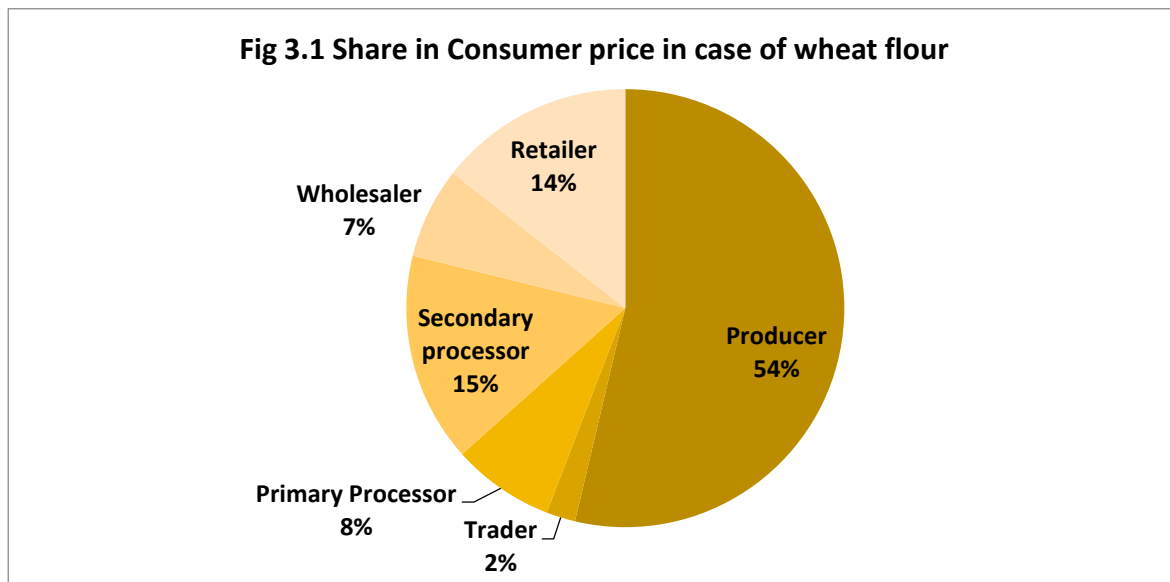
Source: USDA

3.7 The Prevailing Agricultural Value Chain

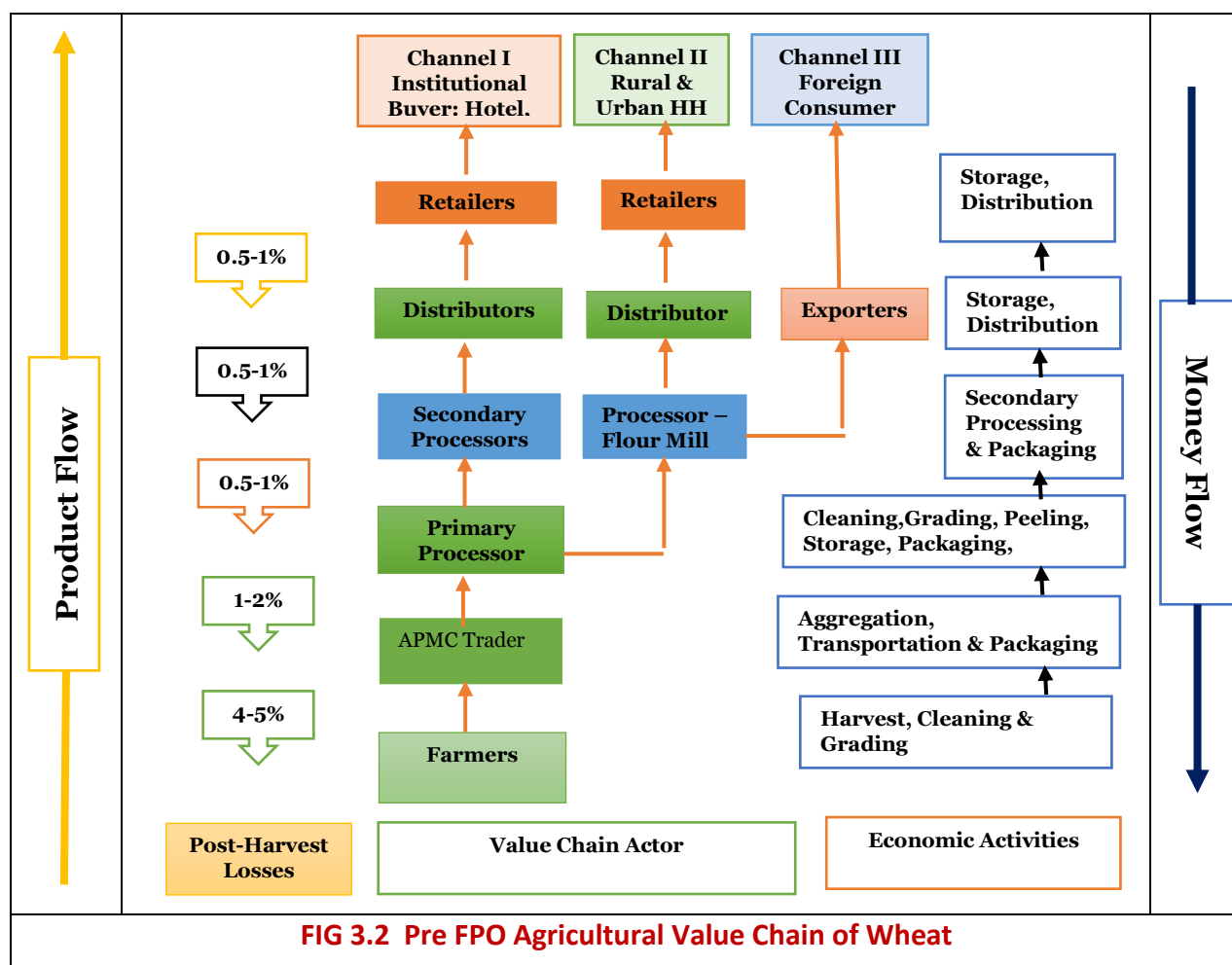
- Producers bring the produce to markets where the produce is aggregated into minimum level lots.
- The further distribution of wheat is handled by arhtiyas at the mandi
- Then it moves to stockists for cleaning/grading units and
- Then to processing units before reaching the consumers through the distribution channels of wholesalers and retailers.

3.8 Share in Price for various Value Chain Actors

- Generally, in case of wheat flour, farmers get a 53.7 % share in a consumer rupee. Share of other value chain actors are given in Fig 3.1
- Considering and taking into account the holding/operations/marketing cost, the profit margin of processors is normally upto 2% -5% and that of retailers and wholesalers is also around 2% -5%.



- The product is largely marketed by farmers through the APMC, local vendors and private processors. We can assess the total channels for marketing to be three. (See Fig 3.2).
- Channel 1, caters to institutional buyers such as hotels, canteens, etc. while channel 2 is for urban and rural households respectively.
- The 3rd channel deals with the consumers from foreign countries that can take both wheat grains as well as processed and packaged wheat products.
- The producers market their produce in both value chains through local traders and APMC Commission agents largely.
- It is observed that the total post-harvest losses are normally in the range of 5% -9% in the storage, handling, transportation of wheat at every stakeholder' point.



Aggregation of Inputs: Value Chain Approach

Size of the land holdings and cost of various inputs affect the cost of production. Here, we have determined the various cost of inputs for small, medium and large farmers as shown in Table 3.2.

Table 3.2: Effect of land holding size on the per ha cost of cultivation of the wheat crop

S. No.	Particulars	Small Farmer		Medium Farmer		Large Farmer	
1	Variable Cost	%	Rs.	%	Rs.	%	Rs.
	Seed Value	2.90	1751.33	2.98	1687.07	2.90	1575.15
	Sowing	3.52	2125.75	3.15	1783.31	1.56	847.32
	Fertilizers	4.43	2675.30	4.82	2728.75	5.12	2780.96
	Irrigation	2.47	1491.65	1.78	1007.71	1.89	1026.56
	Weeding / Hoeing	1.91	1153.46	2.10	1188.88	2.22	1205.81
	Plant Protection chemicals	1.34	809.23	1.69	956.76	2.38	1292.71
	Harvesting	5.80	3502.65	4.49	2541.93	3.64	1977.09
	Threshing	6.38	3852.92	3.89	2202.25	3.21	1743.53
	Transportation	1.24	748.84	0.94	532.16	0.83	450.82
	Interest on working capital	2.70	1630.55	2.32	1313.42	2.14	1162.35

	@9% for six months						
	Total Variable Cost	32.69	19733.60	28.16	15937.90	25.89	14070.28
2	Fixed Costs						
	Rental Value of Land	53.61	32375.40	59.84	33877.28	64.67	35125.87
	Preparatory tillage	6.95	4197.15	6.15	3481.71	3.98	2161.76
	Pre-sowing irrigation	0.22	132.86	0.23	130.21	0.27	146.65
	Total Fixed Cost	60.78	36710.30	66.22	37487.60	68.92	37431.24
3	Management Charges	3.27	1974.77	2.82	1596.49	2.59	1406.77
4	Risk Factor	3.27	1974.77	2.82	1596.49	2.59	1406.77
	Total Cost (1+2+3+4)	100.01	60390.60	100.02	56613.10	99.99	54315.56

Table 3.3: Change in cost of cultivation on account of aggregation (small to larger holdings or operations) in wheat crop

S. No.	Particulars	Reduction in Input Cost (Rs./Ha)	Reduction in Input Cost (%)
1	Variable Cost		
a	Seed Value	-176.18	-0.29%
b	Sowing	-1278.43	-2.12%
c	Fertilizers	105.66	0.17%
d	Irrigations	-465.09	-0.77%
e	Weeding / Hoeing	52.35	0.09%
f	Plant Protection chemicals	483.48	0.80%
g	Harvesting	-1525.56	-2.53%
h	Threshing	-2109.39	-3.49%
i	Transportation	-298.02	-0.49%
j	Interest on working capital @9% for six months	-468.2	-0.78%
	Total Variable Cost	-5679.38	-9.40%
2	Fixed Costs		
k	Rental Value of Land	2750.47	4.55%
l	Preparatory tillage	-2035.39	-3.37%
m	Pre-sowing irrigation	13.79	0.02%
	Total Fixed Cost	728.87	1.21%
3	Management Charges	-568	-0.94%
4	Risk Factor	-568	-0.94%
	Total Cost (1+2+3+4)	-6086.51	-10.08%

- It is observed that the cost of cultivation reduces from Rs.60,390 per ha to Rs.54,315 per ha when the size of the land holding increases from small to large (*Aggregation of resources leads to economy of scale for the producer itself*).
- Aggregate reduction of input cost of cultivation is about 10%.

- However, there is an increase in some cases of the cost of inputs. It could be possible that the larger farmer uses more fertilizer and plant protection measures due to an increase in purchasing power.
- There is a general trend of reduction in quantity and consequently costs on an average per acre basis in respect of most of the inputs.
 - There is an aggregate enhancement of cost of inputs to the extent of **Rs.3,406 per ha** in segment of *fertilizers, weeding & hoeing, plant protection measures and rental value of land*.
 - However, there is also aggregate reduction of **Rs.9492 per ha** in *other inputs*.
- Hence, there is net reduction of Rs.6086.51 per ha when we move from small land holdings to large holdings.

On the basis of the above analysis we can identify the economic activities wherein there is potential to aggregate and manage business operations through the FPO. The list of the activities shortlisted are as under:

- Procurement and selling of seeds where the reduction of input cost can be to the extent of Rs. **176 per ha**, which is 0.26% of the aggregate reduction of input cost.
- The adoption of a *custom and hiring model of mechanization / establishment of farm machinery centres* to cover sowing, harvesting, threshing, transportation and preparatory tillage operation will reduce the costs for these activities to the extent of **Rs.7194 per ha**.
- Hence, by aggregating the inputs such as seeds and mechanization of custom and hiring, the cost of input can be reduced to about **Rs.7371 per ha**.

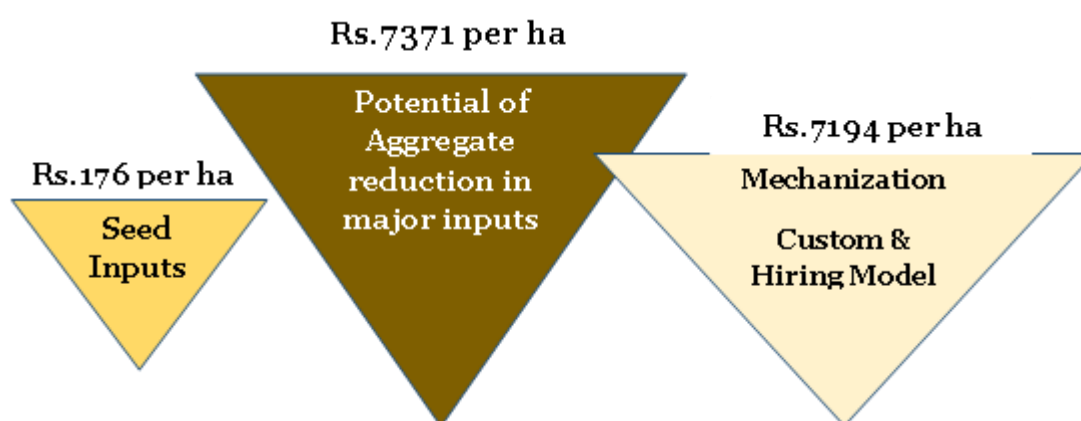


Fig 3.3: Input Business model for reduction of input cost

- This is the direct benefit to the producer apart from the market margin due to the pooling of resources at the FPO level, which is approximately as in Table 3.4 below :

Table 3.4: Impact – Inputs as a Business Activity with market margins & risks for a FPO

S. No.	Suitable business FPO as a value chain actor	Market Margin (%)	Risk Level
1	Seed	5-10	Low
2	Fertilizers / Micronutrients	1-2	Low
3	Plant Protection	15-20	Low
4	Farm Mechanization	8-10	Medium

Optimization Technique for other inputs: For some of the inputs where there is an increase in the cost of inputs such as fertilizers, weeding & hoeing and plant protection measures there is a need to optimize the inputs by proper agronomical measures and through better technical inputs.

Table 3.5: Turnover Potential of FPO with Input Supply

Particulars						
No of Producers	1		100	300	500	1,000
Acreage (Ha)	1		85	255	425	850
	Cost of Input (Rs./ ha)	Market Margin (%)	Rs. In lakh			
Cost of Seed	1,575.15	5	1.34	4.02	6.69	13.39
Cost of Fertilizer	2,780.96	1	2.36	7.09	11.82	23.64
Cost of Plant Protection	1,292.71	15	1.1	3.3	5.49	10.99
Custom & Hiring Centre	8,386.33	8	7.13	21.39	35.64	71.28
Total Turnover Potential of FPO	14,035.15		11.93	35.8	59.64	119.3
Total Market Margin of FPO			0.83	2.48	4.13	8.26

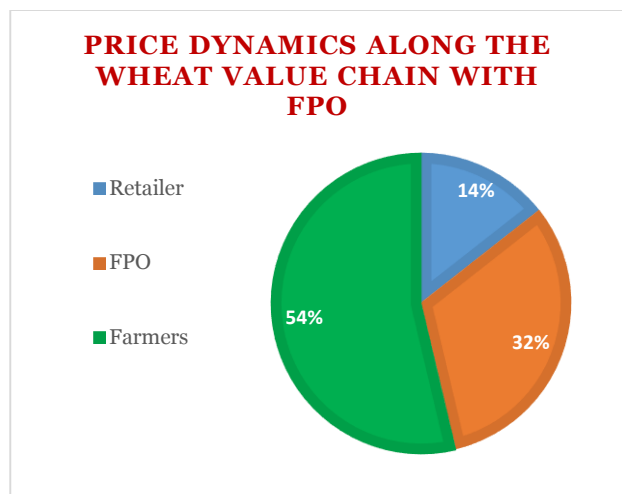
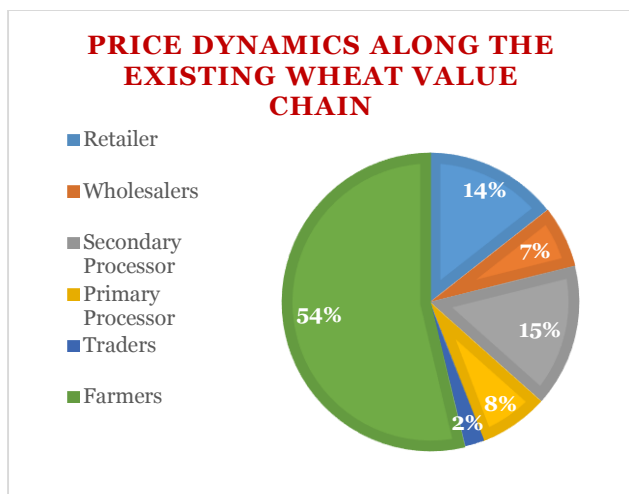
Collective Marketing: Value Chain Approach

While analysing the share of various stakeholders in the agri value chain of the wheat, it is observed by various studies that the number of players range from six to nine from the input supplier to the consumer.

Table 3.5: Price Spread of Wheat marketing with and without FPO

Existing Stakeholder's	Existing Stakeholder's Share in Consumer's Rupee (%)	Opportunity Role for FPO	Margin (%)	Estimated opportunity margin as a FPO (%)	Margin (%)
Retailer	14.43	Retailer	14.43	Retailer	14.43
Wholesalers	6.71	As a Wholesaler	6.71	FPO	31.88
Secondary Processor	15.47	As a Secondary Processor	15.47	Farmers	53.69
Primary Processor	7.55	As a Primary Processor	7.55		

Traders	2.15	As a Traders Processor	2.15		
Farmers	53.69	Farmers	53.69		
TOTAL	100.00		100.00		100.00



Estimated gross margins for the different stakeholders

On the basis of above price spread, considering without and with FPO interventions, the estimated gross margin of FPOs have been worked out for three models consisting of 100 producers with 85 ha under cultivation, 300 producers with 255 ha under cultivation and 500 producer with 425 ha under cultivation. The estimated economic rent (marketing cost and marketing margin) of different stakeholders and economic rent as an opportunity for FPOs have been presented in the table below.

Table 3.4: Prospective Price dynamics in an agri-value chain under wheat crop

	Particulars	Qty	Farmers	Traders	Primary Processors	Secondary Processor	Wholesaler	Retailer
Size of FPO	1	2	3	4	5	6	7	8
	Price Spread (Rs. / q)		1,600	1,664	1889	2350	2550	2980
	Incremental Price Spread (Rs./q)		1,600	64	225	461	200	430
Case I	Number of Farmers	100	100	100	100	100	100	100
	Area (ha)	85	85	85	85	85	85	85
	Yield (@54.37 q/ha) - q	4,621	4,621	4,621	4,621	4,621	4,621	4,621
	Gross Price Spread (Rs. In lakh)		73.94	2.96	10.4	21.3	9.24	19.87
Case II	Number of Farmers	300	300	300	300	300	300	300
	Area (ha)	255	255	255	255	255	255	255
	Yield (@54.37 q/ha) - q	13,864	13,864	13,864	13,864	13,864	13,864	13,864
	Gross Price Spread (Rs. In lakh)		221.82	8.87	31.19	63.91	27.73	59.62
Case III	Number of Farmers	500	500	500	500	500	500	500
	Area (ha)	425	425	425	425	425	425	425
	Yield (@54.37 q/ha) - q	23,107	23,107	23,107	23,107	23,107	23,107	23,107
	Gross Price Spread (Rs. In lakh)		369.71	14.79	51.99	106.52	46.21	99.36

- It is observed that FPOs consisting of a membership size of 100 (Case I), 300 (Case II) and 500 (Case III) with total land holding size of 85 ha, 255 ha and 425 ha respectively, have a business opportunity of Rs.2.96 lakh to Rs.43.90 lakh, Rs.8.87 lakh to Rs.131.70 lakh and Rs.14.79 lakh to Rs.219.51 lakh, respectively depending upon the levels of the business participation starting from the trader to the wholesaler.
- If FPOs are able to undertake Government procurement on MSP then Rs.15.02 lakh, Rs.45.06 lakh and Rs.75.10 lakh, respectively would be the additional gross margin obtained which is 20% over and above the average market price.

Summary of the Potential and prospective business opportunity

On the basis of value chain analysis two business models are deduced which are as under:

Model A: Aggregation of inputs, collective marketing with and without primary and secondary processing

FPO Size (No of Farmers)	Area under Wheat crop (Ha)	Business Participation Potential (Rs. In lakh)		
		Aggregation of Inputs	Collective Marketing in Open Market	Total
100	85	11.93	43.90	55.83
300	255	35.80	131.70	167.50
500	425	59.64	219.51	279.15

Model B: Aggregation of inputs and collective marketing through the Government procurement system presents additional benefits apart from Model A to producers and FPOs :

- Enhancement to the extent of difference in MSP and Rs.1600 per quintal to the producers.
- Additional benefits to FPO on account of reimbursement of commission charges for the procurement, transportation charge, loading and unloading charges, bags etc. by the State Government.

The FPO can undertake business participation in a combination of the above two models depending upon the available resources, capability, infrastructure support system and enabling policy interventions.

Chapter 4: Paddy

The Agricultural Value Chain

4.1 Introduction

- About four-fifths of the world's rice is produced by small-scale farmers and is consumed locally.
- India is the second largest producer of rice in the world after China, accounting for 20% of all world rice production.
- India is the biggest consumer of rice in the world. Consumption estimates of rice has also gone up steadily from about 80-85 million tonnes in the early 2000s to about 104.32 million tonnes in 2015-16.
- It occupies about 22 per cent (43.39 million ha) of the total cultivated area in the country.
- India has the largest area under paddy in the world.

4.2 Input Management and Production System

- Lack of knowledge of the latest paddy production technologies among the local farmers. Though experts in traditional farming techniques, Indian farmers do not have access to modern farming technologies
- In some regions producers face non-availability of improved & good quality seeds.
- A comparative low level of mechanization
- There is a lack of sufficient irrigation
- Depletion of irrigation water resources is likely to put pressure on the area under paddy cultivation in north India, especially since newer varieties are more water guzzling
- Many operations be modernised to gain a competitive advantage in the era of globalisation.

4.3 Post-Harvest Management

- During the long supply chain process many activities take place at every stage which affect the function of next stage and require mutual cooperation and understanding as part of an institutionalised process for enhanced productivity.
- This crop has some farmers with large holdings involved in an organised production mode through a business approach and they produce paddy / rice on a very large scale.
- The second type of farmers are Small Land Holding Farmers, working on small farms in villages, whose productivity is low, and can spare a very low amount of paddy as surplus for sale after keeping a part of the stock for their own use during the year.

- There is also the non-availability of scientific storage facilities/ silos / warehouses near production centres for storing round the year

4.4 Value addition - Processing

- One of the basic issues of processing is that the yield of rice varies according to the variety of the paddy.
- In a fine variety the yield varies from 55% to 60% while in other varieties (coarse varieties) the yield varies from 62 %to 65%.
- This creates a problem for the procurement of rice on MSP as FCI stipulate 67 kg yield for reimbursement of 100 kg of paddy.
- Obsolete techniques are being used in processing, which reduces output.
- Inadequate sorting and grading facilities near production site fetches lesser price to farmers.
- There are sizeable post-harvest losses due to in-efficient storage practices.

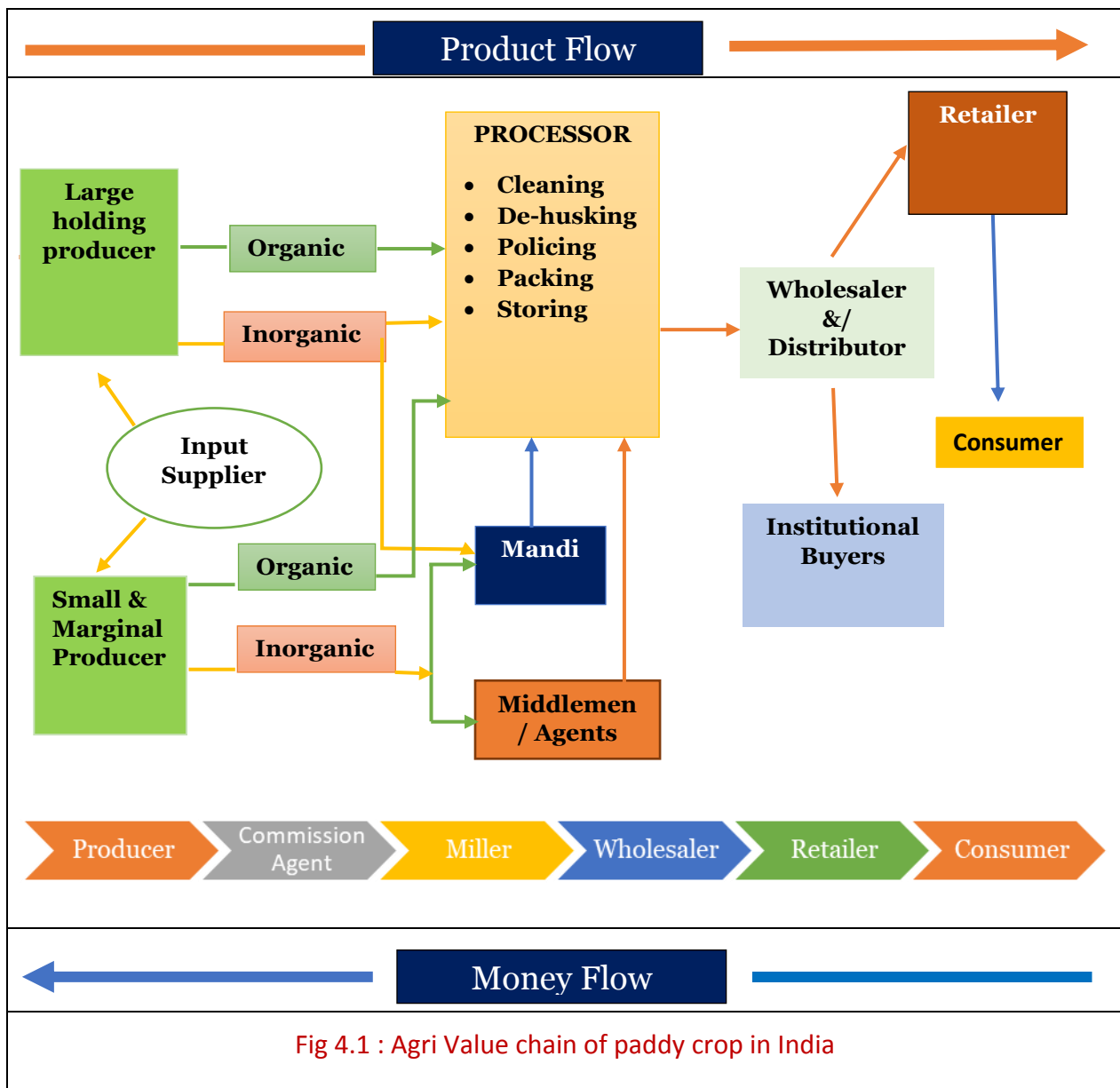
4.5 Marketing

- The surplus rice marketed ratio has increased by 15.5 percentage points i.e. from 61.7% in 1999-00 to 77.2% in TE-2011-12).
- The paddy producers are mainly subsistence and semi subsistence farmers.
- Most farmers sell paddy immediately after harvest for fulfilling their cash requirements.
- The movement from the farm to the processor and consumer has variations cross India but largely the scenario is as stated below.
 - Both farmers with large and small land holdings use the same strategy for distribution of organic paddy, as they are directly sent to the rice processing company without the involvement of any intermediary.
 - The process for inorganic farmers is different based on their land sizes. The rice processing companies adopt different supply chain strategies with large land holding farmers and the smaller ones in order to source the paddy.
 - Large land holding farmers most often directly supply their paddy to the rice processing companies which reduces the cost incurred on middlemen and increases the revenue. Rice processing companies also find it profitable to source directly from the farmers as it reduces their procurement cost, logistics cost, intermediary cost and the supply chain cost.
 - Inorganic farmers with small land holding either sell their paddy in a 'Mandi', a marketplace in the town areas where the small farmers of nearby villages sell their yields from farms and the processing units purchase the grains and vegetables either directly or through agents, which is a convenient common platform for the small paddy farmers to sell and also for rice processing companies to procure.

- The rice processing companies procure the paddy through middlemen or Agents, who purchase the paddy from small farmers in small quantities and then sell them in bulk to the rice processing companies. In Punjab and Haryana, the Government procures paddy at the MSP and then earmarks it to the processors for milling.
- Direct procurement from small farmers is not profitable for the rice processing companies as their cost of logistics and supply chain will be higher compared to that of sourcing through 'Mandies' and 'Agents'.
- Profit margins vary in the rice value chain due to market imperfections, unequal bargaining power among different actors and the unavailability of timely market information etc.
- After the harvesting of paddy, the produce is dried and marketed to various stake holders after bagging.
- After the post-harvest operations such as drying, bagging the produce, the paddy is ready for marketing.

4.6 Prevailing Agricultural Value Chain

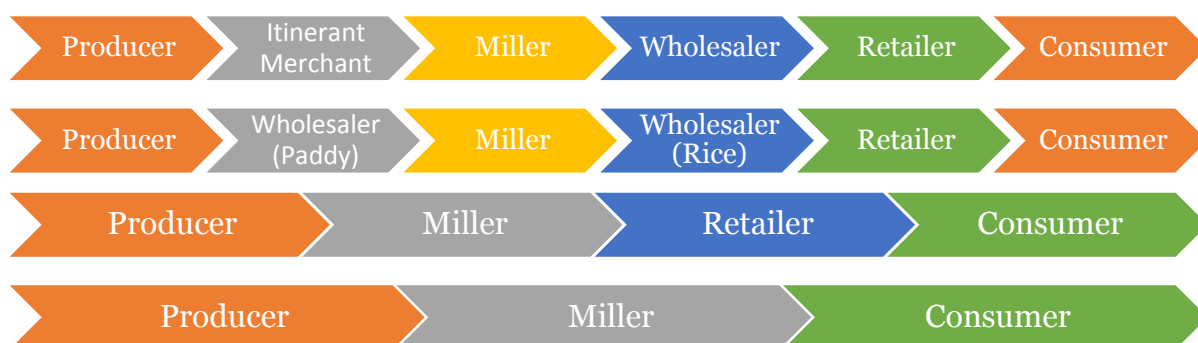
- If the actors know the benefit of participation in an improved value chain, ensure the optimum quality of paddy and rice, it increases both the actor's as well as the ultimate consumer's welfare.
- The development and upgrading of the value-chain have significant implications on food security, poverty alleviation and overall economic development.
- Apart from the main product (Paddy) the by-product (paddy straw) can be used as fodder for the cattle.
- The existence of many intermediaries between the farmer and the rice processing company, and between the processing company and the customer, results in greater complexity, lower efficiency, a reduced margin and increased cost of the product.



4.6 Value Chain Actors

- The product is largely marketed by farmers through the APMC, local vendors and private processors.
- It is seen from the diagram above that the paddy from various stakeholders has to go to the miller for processing.
- Various types of marketing channels prevailing in different regions are as under :





4.7 Export of Basmati Rice from India

- The export of basmati rice has been particularly significant and profitable for Indian farmers due to its high demand and superior quality.
- Between January and October of 2020, basmati rice export stood at 11.95 million tons, whereas in 2019 it was 8.34 million tons.
- The preference for long grain rice, particularly in the Middle East and among the Indian diaspora has led to an overall increase in the demand for basmati rice. The Middle East and other Arabian countries are the biggest markets for basmati rice exported from India.
- Overall, India shipped out over 14 million tons of rice around the world, leading to it gaining a significant market share in the global rice export industry.
- The major importers of Indian basmati rice are United States of America, United Kingdom, Singapore, Saudi Arabia and Malaysia.

4.8 Export of Non- Basmati Rice from India

- The export of non-basmati rice from India has been steadily growing in recent years and witnessed a considerable spike in 2020.
- We managed to export 61% more non-basmati rice in 2020 when compared to the previous year.
- In 2020, India exported 7.6 million tons of non-basmati rice making it the best year for the export of such variants.
- Additionally, this is great news economically for farmers across the country as it enables us to ship out more variants of rice to the global market.
- Major markets for non-basmati rice are Africa, and certain areas of the Middle East.
- Fluctuating Government policies on exports could be an area of concern.

4.9 Aggregation of Inputs: Value Chain Approach

First of all we have to understand the input management segment i.e. effect of the land holding size on unit cost of various inputs which will give the direct relationship between the aggregation of inputs and change in the cost of cultivation. Here, we have assessed the cost of inputs for small, medium and large farmers as depicted in the Table.

Table 4.1: Effect of land holding size on the cost of cultivation of the paddy crop

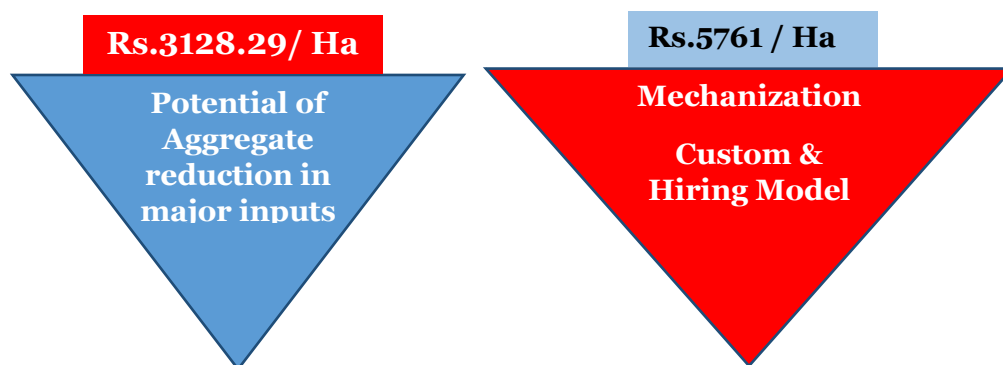
	Particulars	Small	Small	Medium	Medium	Large	Large
1	Variable Cost	%	Rs.	%	Rs.	%	Rs.
	Seed Value	0.96	561.83	1.32	752.30	1.47	814.32
	Seed Treatment	0.12	70.23	0.13	74.09	0.14	77.55
	Transplanting	5.34	3125.21	5.07	2889.51	4.96	2747.65
	Fertilizers	3.15	1843.52	4.47	2547.55	5.14	2847.36
	Irrigation	2.89	1691.36	1.94	1105.65	1.85	1024.83
	Weeding / Hoeing	1.28	749.11	1.49	849.18	1.58	875.26
	Plant Protection chemicals	1.45	848.60	1.84	1048.66	2.03	1124.54
	Harvesting and Threshing	11.32	6624.97	7.37	4200.33	5.64	3124.35
	Transportation	1.62	948.10	1.18	672.51	0.99	548.42
	Interest on working capital @9% for six months	2.53	1480.67	2.98	1698.37	2.14	1185.48
	Total Variable Cost	30.66	17,945.36	27.79	15,842.12	25.94	14,379.8
2	Fixed Costs						
	Rental Value of Land	55.32	32375.74	59.44	33876.19	63.41	35126.73
	Preparatory tillage	7.71	4512.24	6.99	3983.76	5.24	2902.76
	Pre-sowing irrigation	0.17	99.49	0.22	125.38	0.21	116.33
	Total Fixed Cost	63.20	36,990.05	66.65	37,981.70	68.86	38140.38
	Management Charges	3.07	1,796.70	2.78	1,584.38	2.60	1,440.30
	Risk Factor	3.07	1,796.70	2.78	1,584.38	2.60	1,440.30
	Total Cost (1+2+3\$)	100.00	58,524.47	100.00	56,992.24	100.00	55,396.2

Table 4.2: Change in cost of cultivation on account of aggregation in paddy crop

S. No.	Particulars	Reduction in Input Cost (Rs./Ha)	Reduction in Input Cost (%)
1	Variable Cost		
	Seed Value	252.49	0.43%
	Seed Treatment	7.32	0.01%
	Transplanting	-377.56	-0.65%
	Fertilizers	1,003.84	1.72%
	Irrigations	-666.53	-1.14%
	Weeding / Hoeing	126.15	0.22%

	Plant Protection chemicals	275.94	0.47%
	Harvesting and Threshing	-3,500.62	-5.98%
	Transportation	-399.68	-0.68%
	Interest on working capital @9% for six months	-295.19	-0.50%
	Total Variable Cost	-3,573.84	-6.10%
2	Fixed Costs		
	Rental Value of Land	2,750.99	4.70%
	Preparatory tillage	-1,609.48	-2.75%
	Pre-sowing irrigation	16.84	0.03%
	Total Fixed Cost	1,158.35	1.98%
3	Management Charges	-356.4	-0.61%
4	Risk Factor	-356.4	-0.61%
	Total Cost (1+2+3+4)	-3,128.29	-5.34%

- It is observed that when we move from small holding farmers to large farmers the cost of cultivation reduces from Rs.58,524 to Rs.55,396 per ha which is about **5.34%**.
- However, there is an increase in cost of some of the inputs but overall there is a general trend in the reduction of the cost of inputs. The effect of the size of land holding on the reduction / increase in the various cost of inputs is analysed and illustrated in Table 4.2.
- Except the cost of inputs pertaining to seed, seed treatment, fertilizers, weeding & hoeing, plant protection measures, rental value of land and pre sowing irrigation, there is an overall reduction in all other cost of inputs.
 - There is aggregate enhancement of **Rs. 4,433 per ha** in segment of seed, seed treatment, fertilizers, weeding & hoeing, plant protection measures, rental value of land and pre-sowing irrigation.
 - However, there is aggregate reduction of **Rs. 7,561 per ha** in other inputs.
 - Hence, there is net reduction of input cost is about **Rs. 3,128 per ha** when we move from small land holdings to large holdings.
- On the basis of the above analysis we can identify the activity which has a potential to be aggregated and managed through the business operations of an FPO.
- Custom and hiring model of mechanization or establishment of farm machinery centres to cover sowing, harvesting, threshing, transportation and pre tillage operation is an area to be focused upon by FPOs.
- Consequently, by aggregating mechanization operations on a custom hiring basis only, the farmers can reduce cost of input to the extent of about Rs.5,761 per ha.



Optimization Technique for other inputs: For some of the inputs where there is increase in the cost of inputs such as seed, seed treatment, fertilizers, weeding and hoeing and plant protection measures there is a need to optimize the inputs by proper agronomical measures and through better technical inputs.

Table 4.3: Inputs - Business Model for different FPO's – numbers and Acreage

Particulars						
No of Producers	1		100	300	500	1,000
Acreage (Ha)	1		85	255	425	850
	Cost of Input (Rs./ ha)	Market Margin (%)	Rs. In lakh			
Cost of Seed	814.32	5	0.69	2.08	3.46	6.92
Cost of Fertilizer	2,847.36	1	2.42	7.26	12.10	24.20
Cost of Plant Protection	1,202.09	15	1.02	3.07	5.11	10.22
Custom & Hiring Centre	10,198.44	8	8.67	26.01	43.34	86.69
Total Turn Over Potential of FPO	15,062.2		12.8	38.42	64.01	128.00
Total Market Margin of FPO			0.91	2.72	4.53	9.06

The gross margin of an input business comprising of the aggregation of seed, fertilizer, plant protection measures and farm mechanization is estimated to the extent of **Rs.0.91 lakh to Rs.9.06** for cultural command area (CCA) under paddy crop varying from 85 ha to 850 ha, respectively.

4.9 Collective Marketing: Value Chain Approach

An analysis of the share of various stakeholders in the paddy agri-value chain, reveals that the number of value chain actors varies from 4-8 from the input supplier to the producer and ultimately the consumer.

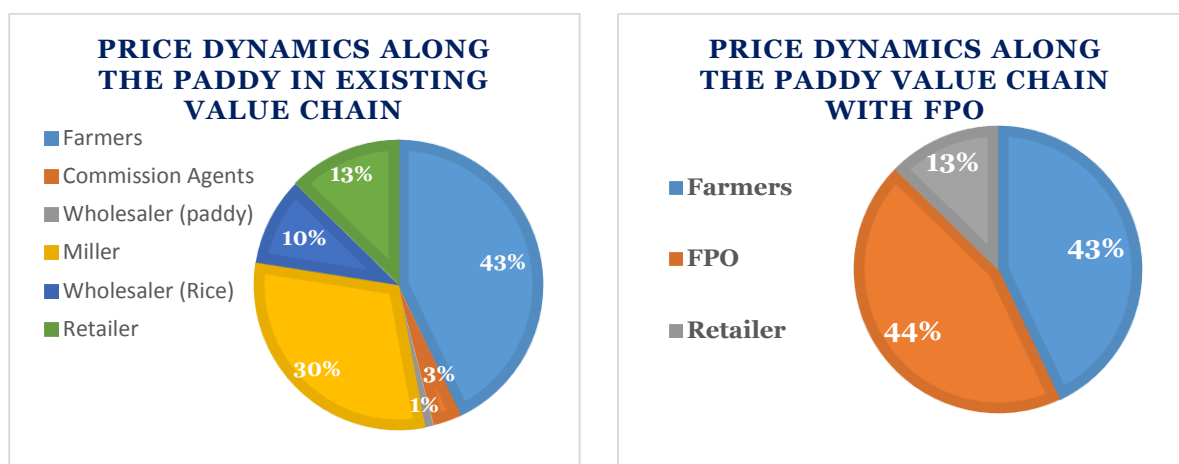
Table 4.4: Consumer Price - spread across the economic activities and Value Chain Actors

Value Addition Activities	Actor	NORTH INDIA		SOUTH INDIA		Opportunity for FPO Participation
		Rs./q	Value addition (Rs./q)	Rs./q	Value addition (Rs./q)	
Wet Paddy	Farmers	1157.03	1157.03	1660.50	1660.50	
Drying Cost	Farmers	8.62	1165.65	13.22	1673.72	
Marketing Cost	Commission Agent	14.89	1180.54	20.49	1694.21	FPO-Stage I
Net Marketing Margin	Commission Agent	71.88	1252.42	103.41	1797.62	FPO-Stage I
Storage Cost for 3 Months	Wholesaler	25.00	1277.42	25.00	1822.62	FPO-Stage II
Net Marketing Margin	Wholesaler	6.88	1284.30	4.38	1827.00	FPO-Stage II
Processing Cost	Miller	183.50	1467.80	234.41	2061.41	FPO-Stage III
Weight Loss	Miller	17.19	1484.99	14.20	2075.61	FPO-Stage III
Selling Cost	Miller	36.39	1521.38	43.58	2119.19	FPO-Stage III
Net Marketing Margin (Processed)	Miller	765.81	2287.19	716.11	2835.30	FPO-Stage III
Cost of Distribution	Wholesaler	50.00	2337.19	50.00	2885.30	FPO-Stage IV
Net Marketing Margin (Wholesalers)	Wholesaler	238.42	2575.61	311.98	3197.28	FPO-Stage IV
Cost of Retailers	Retailers	68.28	2643.89	76.55	3273.83	
Net Marketing Margin (Retailers)	Retailers	342.11	2986.00	349.17	3623.00	
Total		2986.00		3623.00		

Table 4.5: Business opportunities for the FPO as a value chain actor

Value Chain Actor and earnings per quintal	North India (Rs./q)	South India (Rs./q)	Average (Rs./q)	Value Chain Actor	(Rs./q)
Farmers	1,165.65	1,673.72	1,419.69	Farmers	1,419.69
Commission Agents	86.77	123.90	105.34	FPO	1,466.77
Wholesaler (paddy)	31.88	29.38	30.63	Retailer	418.06
Miller	1,002.89	1,008.30	1,005.6		
Wholesaler (Rice)	288.42	361.98	325.2		
Retailer	410.39	425.72	418.06		
Consumer Price	2,986.00	3,623.00	3,304.52		3,304.52

An analysis of the value chain of the paddy crop, reveals that there are 6-7 players involved in the supply chain. In the existing value chain, farmers are getting 43% of the consumer's price of the rice. The economic rent for the remaining value chain actors such as the commission agent, wholesaler, processor and retailers is 3%, 1%, 30%, and 13%, respectively.



Estimated gross margins for the different stakeholders

On the basis of above price spread, considering the without and with FPO scenario, the estimated gross margin of FPOs has been worked out for 100 member with 85 ha under cultivation, 300 members with 255 ha of under cultivation and 500 farmers with 425 ha under cultivation. The estimated gross margins of different stakeholders and the gross margin as an opportunity for FPOs has been presented in the table below.

Table 4.5: Prospective Price dynamics in agri-value chain under paddy crop

Size of FPO	Particulars	Qty	Farmers	C. Agents	Wholesaler (paddy)	Miller	Wholesaler (rice)	Retailer
	1	2	3	4	5	6	7	8
	Price Spread (Rs. / q)		1,419.69	1,525.03	1,555.66	2,561.26	2,886.46	3,304.52
	Incremental Price Spread (Rs./q)		1,419.69	105.34	30.63	1,005.60	325.20	418.06
Case I	Number of Farmers	100	100	100	100	100	100	100
	Area (ha)	85	85	85	85	85	85	85
	Yield (@54.37 q/ha) - q	4,621	4621	4621	4621	4621	4621	4621
	Gross Price Spread (Rs. In lakh)		65.6	4.87	1.42	46.47	15.03	19.32
Case II	Number of Farmers	300	300	300	300	300	300	300
	Area (ha)	255	255	255	255	255	255	255
	Yield (@54.37 q/ha) - q	13,864	13,864	13,864	13,864	13,864	13,864	13,864

	Gross Price Spread (Rs. In lakh)		196.83	14.6	4.25	139.42	45.09	57.96
Case III	Number of Farmers	500	500	500	500	500	500	500
	Area (ha)	425	425	425	425	425	425	425
	Yield (@54.37 q/ha) - q	23,107	23,107	23,107	23,107	23,107	23,107	23,107
	Gross Price Spread (Rs. In lakh)		328.05	24.34	7.08	232.36	75.14	96.6

The annual gross margin of the FPOs consisting of a membership of 100 (Case I), 300 (Case II) and 500 (Case III) with a total land holding size of 85 ha, 255 ha and 425 ha could range from Rs.4.87 lakh to Rs.67.79 lakh, Rs.14.60 lakh to Rs.203.40 lakh and Rs.24.34 lakh to Rs.342.92 lakh, respectively, depending upon the levels of the business participation as a value chain actor starting from the commission agent to the wholesaler (rice).

4.10 Summary of the Potential and prospective business opportunity

The following two business models are based on value chain analysis of paddy crop **Model A:** Aggregation of inputs, collective marketing with and without primary and secondary processing

FPO Size (No of Farmers)	Area under Paddy crop (Ha)	Business Participation Potential (Gross Margin) (Rs. In lakh)		
		Aggregation of Inputs	Collective Marketing in Open Market	Total
100	85	12.80	67.79	80.59
300	255	38.42	203.40	241.82
500	425	64.01	338.90	402.91

Model B: Aggregation of inputs and collective marketing through the Government procurement system

If an FPO participates in the agri value chain for procurement of paddy under the Government procurement system then the difference of MSP and Rs.1420 / quintal would be the additional benefit to the producer members.

Reimbursement of commission charges, loading and unloading charges, transport charges, processing charges etc., would be a facilitation from the Government.

FPOs can explore the possibilities of engaging in a combination of the above two models depending upon the available resources, capability, infrastructure support system and enabling policy interventions.

Chapter 5: Maize

The Agricultural Value Chain

5.1 Status, issues and prospect of maize in India

- Maize is a multi-faceted crop used as food, feed and is a vital industrial crop globally. Maize has a very prominent role to play in the Indian economy too.
- Maize generates employment of more than 650 million person days at farm. 15 million farmers in India are engaged in the cultivation of maize
- Maize is less water demanding and gives a higher yield per hectare. By growing maize farmers save 90% of water, 70% of power compared to paddy. Only 15% of the cultivated area of maize is under irrigation
- 5-7% of the maize produced in India is unutilised due to improper storage
- The consumption of maize has increased at a CAGR of 11% in last five years. Today, maize is a source of more than 3500 products including specialised maize such as the QPM “Quality Protein Maize”.
- The increasing interest of consumers in nutritionally enriched products and the rising demand for poultry feed, which accounts for 47% of the total maize consumption are the driving forces behind the increasing consumption of maize in the country.
- Demand estimates suggest Indian maize production has to grow at a CAGR of 15% in the next 4-5 years.
- The cumulative demand comprises of 13.5 million MT for poultry feed, 1.8 million MT for starch, 1.2 million MT for ethanol and the balance for food, seed and other usage.
- The Feed industry growing at a CAGR of 9% presents a huge opportunity for maize growers
- India has achieved a production level of 26 million MT in maize, it could require 45 million MT of maize by the year 2025 – 2027 or so.
- The existing productivity level of maize should double from 2.5 MT/ha to 5 MT/ha with a subsequent increase in farmer’s income. The difference in the average yield of maize between India and the world is 130%- which raises a great concern.
- The advantage of maize is that it is a hardy crop and, is therefore, well suited to less endowed cropping environment particularly in a situation of climate change.
- India needs to plan production by an increase in productivity and also by reorienting the value chain if it is to serve the basic goal of remunerative prices for farmers.
- Developing an integrated value chain plan for the Indian maize sector, focusing on a clear objective of doubling productivity of maize in selected states is a prime requirement.
- Promotion of skill development centres focused on maize and maize oriented farm machinery banks for small and marginal farmers can be the big game changers.

5.2 Demand and supply pattern of maize

Supply-Demand Economics

I	Production + Import > Consumption + Export	Supply exceeds demand, Surplus occurs
II	Production + Import = Consumption + Export	Supply equals demand, Market is in equilibrium
II	Production + Import < Consumption + Export	Demand exceeds supply, Shortage occurs

Any FPO entering this sector must understand and study the scenario as above as also the seasonality, both in supply and demand.

Seasonality of supply and demand of maize

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Demand												
Supply												

Source:- PwC analysis based on GRAIN Report 'India: Grain and Feed Annual 2017

	Strong Demand
	Weak Demand
	Strong Supply
	Weak Supply

- Demand and supply in maize largely depends upon its sowing and harvesting season.
- Strong demand rises during January to March, whereas strong supply occurs twice: March to May for winter maize and September to December for the monsoon maize.
- The crop duration ranges between 90 to 150 days, varies from state to state and variety to variety.
- Poultry farms and feed millers hold stocks for a period ranging from 15 days to 60 days, depending on their mill capacities, financial strength, and receivables cycle.
- Usually, they purchase and stock maize during the peak arrival season at low prices.
- This stock is maintained to tide over the peak price months, and buying for regular requirement continues in parallel.
- Starch manufacturers store it for longer durations, sometimes as long as three months.
- The role of traditional stockists has been taken over by the trading companies, who normally enter into a forward trade agreement with the consumers (say, a poultry farm) and purchase and store grains during the peak arrival season.
- This stocking pattern, coupled with the sowing and harvesting seasonality are majorly impacting the supply and demand equation of maize
- Production is a key component of Supply and obviously has a direct bearing on the pricing and its fluctuations.

Supply pattern of maize

Global Scenario

In the global perspective, the US has been the leading maize producer, followed by China, accounting for about 38% and 23% respectively on one hand, where US maize production has shown a comparative increase owing to increased plantings; in China, it has declined owing to drought and other adverse and unfavorable climatic conditions.

Table 5.1 : Yield (MT/ ha) and production (m-MT) of maize in leading nations of World

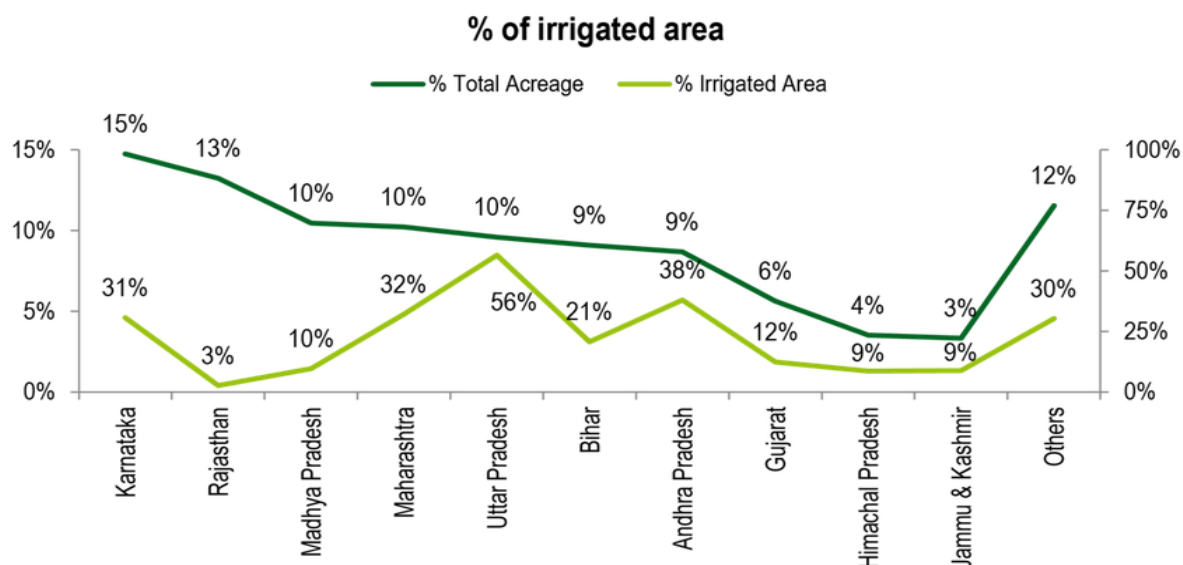
Country	Coverage (%)	Yield / Production	2013-14	2014-15	2015-16	2016-17	CGAR
US	38	Production	351	361	345	384	4.6
		Yield	9.93	10.73	10.57	10.96	5.06
China	23	Production	218	215	224	219	0.23
		Yield	6.02	5.81	5.89	5.97	-0.42
Brazil	9	Production	80	85	67	96	9.54
		Yield	5.06	5.4	4.19	5.49	4.16
India	2	Production	24	24	20.5	26	4
		Yield	2.68	2.63	2.56	2.54	-3
World		Production	993	1018	968	1040	2.34
		Yield	5.5	5.67	5.44	5.82	2.87

Production and productivity scenario in India

- Maize production in India depends heavily on the South west monsoon as more than three-fourth of the maize is produced in the Kharif season.
- Poor monsoon rainfall affects the yield of Kharif maize.
- Dry soils and inadequate irrigation as also the availability of water affect the planting of Rabi maize.

Irrigated vs. un-irrigated maize

- Maize in India is cultivated across various ecosystems – it is estimated that almost 75% of the total area under maize cultivation in India is un- irrigated.
- A concern is the poor quality of irrigation infrastructure and the unpredictable intensity of the monsoon to provide sufficient reserves for reservoirs.
- If we compare the top ten maize acreage states of India, only Uttar Pradesh irrigates more than 50% of its total maize area.
- For the remaining top ten states, the incidence of irrigation is below 35%, except Andhra Pradesh where 38% of the maize area is irrigated. In states like Rajasthan and Madhya Pradesh which have 13% and 10% of the total area under Maize respectively, the level of irrigation stands at 3% and 10% only.



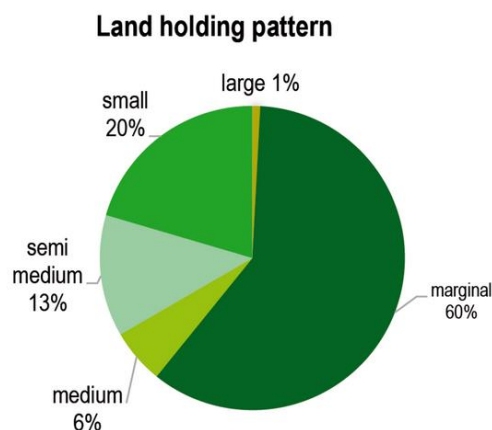
Land holding pattern for Indian maize farmers

- The majority of maize farming (60%) is done by marginal farmers who have an acreage of less than 1 hectare.
- In general, individual land holding in India is significantly smaller than the major agri-based countries and this holds true in case of maize farming as well.
- Bihar and Uttar Pradesh are states known for small land holdings, and these two states have 20% and 11% of the total number of maize land holdings in India respectively.
- The majority of these farmers are marginal farmers.

Causes of low maize yields in India

In India, the yield is almost half of the overall global average. The reasons for this include:

- **Climate:** Agriculture in India is mainly dependent on the monsoon, and only 30% of the total land under cultivation of maize is irrigated which affects the yield;
- **Small land holding:** The majority of the land is held by marginal farmers with limited resources, which means the use of modern technology and farm management tools is limited;
- **GMO seeds:** There are strict regulations for GMO maize seeds, which are a key factor for higher yields in countries like USA and China;
- **Crop protection:** There is generally a limited usage and awareness of crop protection technology.



Yield loss due to biotic stresses in India

- The maize plant is subjected to critical weed infestations, insects and diseases which significantly reduce the overall yield.
- It is estimated that maize yield is reduced by around 25% because of biotic stresses.
- Some of the common diseases and pests affecting maize are: Pink borer (*Sesamia inferens*), Shoot fly (*Atherigona* sp.), Stem Borer (*Chilo partellus*), Termites (*Odontotermes obesus*), American bollworm, Chaffer beetle, Turicum leaf blight (*Exserohilum turcicum*), and Common rust (*Puccinia sorghi*). The maize crop is also affected by many species of narrow and broad leaf weeds.

State-wise Maize production

- Maize is cultivated in almost all types of agro-ecological regions.
- Only 7-8 states together account for more than three fourths of maize area as well as production in the country.
- A regional shift in production has been observed from north to south; Bihar, Uttar Pradesh and Madhya Pradesh were the major maize producing states in 1990s, but during the past two decades, southern states, especially Andhra Pradesh and Karnataka, have become the major maize-producing states.
- Only four states: Karnataka, Rajasthan, Andhra Pradesh and Madhya Pradesh, constitute about half of the total maize acreage in the country.
- Five states, viz. Karnataka, Andhra Pradesh, Maharashtra, Rajasthan and Bihar, together account for about 2/3rd of the total maize production.
- Though Rajasthan and Madhya Pradesh have a large share in maize area, but the productivity being low, make a low contribution to maize production in India.
- According to the maize production data of recent years, states with more than 10% of maize area are categorized as follows:

Productivity Group	Criteria	States	Percentage Coverage
High	>4 MT/ha	Andhra Pradesh & Tamil Nadu	13.00%
Medium	2-4 MT/ha	Bihar, HP, Karnataka, Maharashtra, Odisha, Punjab, West Bengal.	40.20%
Low	4 MT/ha	Chhattisgarh, Gujarat, J&K, Jharkhand, MP, Rajasthan, UP	43.80%

Source:- Assessment of Maize situation, Outlook and investment opportunities in India (Ranjit Kumar, K. Srinivas, N. Sivaramane)

- The **reason behind such a low yield** (<2 T/Ha as mentioned above in case of low productivity states) is that in these states, **maize is grown as a rain fed crop**.
- Secondly, it is used mainly as a food crop, for which traditional or composite varieties are preferred.
- Lesser usage of hybrids coupled with the usage of lower nutrients and the risk of water unavailability leads to lower productivity.

- In order to understand the practices as regards maize cultivation and the emerging trends across states, one state has been picked up from the high, medium and low maize productivity classification and this is explained below:

Productivity Classification	States/ Region	Probable contributing factors to the production scenario
High	TN	• Maize cultivation under assured irrigated conditions (insulation from vagaries of monsoon) • Emerged as an important Rabi crop mainly for feed and industrial purposes, due to the large set up of poultry industry in the region. (increased industrial demand) • Maize area in the state increased almost three times in the past 10 years, mainly due to rapid hybridization (technological interventions) • Demand support and conducive price of maize grain for the local poultry industry, which was erstwhile sourced from Andhra Pradesh, Karnataka and sometimes from Bihar. (local demand promotion)
Medium	Bihar	• Rabi maize (>400 thousand ha) is prominent than that Kharif maize (>230 thousand ha); and the state is an important source for Rabi maize. • Rabi maize has a comparative advantage over Kharif maize due to low infestation of insect, pest and diseases as well as slow growth of weeds. (Agroecological factors) • Kharif maize is dependent on Monsoon and large maize growing tracts are prone to floods (Natural & Geographical factors)
Low	Chhattisgarh	• All maize-growing districts are low yielding because of very low adoption of hybrid maize, as the crop is produced mainly for human consumption. (Lack of technological breakthrough) • The state government also promotes composite seeds through State Seed Corporation and not the promising hybrids from the private sector, which limits the yield growth.

- Agri-sector value chain actors and stakeholders could emulate the factors leading to better performance in high productivity states and bring the moderate and lower states at par.
- “Consumption”, industrial and /or retail is a key factor deciding the demand for Maize, and this demand in turn creates a ‘pull’ in terms of prices which drives the farming decision for farmers.

Demand pattern of Maize

Consumption outlook in India

- More than two third of the maize produced in India is consumed for feed and other industrial uses.
- Feed industry and Indian poultry industry i.e. eggs and poultry meat sector, is growing.
- Keeping these factors in view, maize will continue to remain an important crop for food, feed and fodder purposes.
- The non-food industrial products account for the remaining 20% of India's maize consumption.
- Starch is the most important in this category accounting for 14% of the total maize consumption.
- The remaining 6% is accounted for exports and other industrial non-food products.
- International trade accounts for only 10 percent of world maize production
- Global trade in maize has increased significantly over the past two decade.

Trade outlook for India

- Indian Maize is ***uncompetitive in the international market due to relatively weak international prices and low productivity in India***. However states with high productivity can certainly tap the markets for exports.
- The domestic prices have remained firm on strong demand, rising MSPs, and tariff and non-tariff barriers to import.

India's export scenario

- Indian Maize exports have slowed down significantly since FY 2015- 16 on uncompetitive prices. FY 2016- 17 exports were estimated at 0.5 Mn MT.
- A large chunk of Indian maize (85-90% of total export) is exported to the South East Asian countries like Indonesia, Vietnam, Malaysia, Taiwan, etc. and the remaining 10-15 per cent is exported to the Middle-East countries and Bangladesh, Nepal, Bhutan, etc.
 - Producing maize cultivars suiting to the importing countries, maintaining stringent quality standards in the entire supply chain from farm to the port in a cost effective manner may help in achieving a higher export share in SE Asia region.

5.3 Maize Value Chain Analysis

Producer and Production of maize

Average cost of sale comes to about Rs.44,058 and the average revenue is around Rs.52.800 with a productivity of 48 quintal per ha.

Table 5.2: Input-wise production cost and net margin in ha area

S. No.	Producer	Unit	No of Unit	Unit Cost	Amount
A	INPUT COST				
1	Seed	Kg	10	500	5,000.00
2	Seed treatment	Gram	40	1.1	44.00
3	Urea	Bag	2	330	660.00
4	DAP	Bag	2	1250	2,500.00
5	MOP	Bag	1	600	600.00
6	FYM	MT	2	1000	2,000.00
7	Pesticides	Litre	1	500	500.00
8	Weedicides	Litre	1	350	350.00
9	Fungicides	Litre			0.00
10	Growth Hormones	Litre			0.00
11	Irrigation	No	6	750	4,500.00
12	Bags	Bag	96	15	1,440.00
	Sub Total				17,594.00
B	LABOUR COST				
1	Field Preparation	Hr	3	800	2,400.00
2	Sowing i/c seed treatment	Day	8	200	1,600.00
3	Intercultural Operation	Day	20	200	4,000.00
4	Manuring	Day	1	200	200.00
5	Fertilizer	Day	1	200	200.00
6	Pest Control	Day	1	200	200.00
7	Harvesting (6.5%of sale)	%	6.5	52800	3,432.00
8	Threshing (2% of sales)	%	2	52800	1,056.00
9	Bagging and Drying for 3 days	Day	3	200	600.00
10	Transport to home	Trip	1	1000	1,000.00
11	Storage				60.00
	Sub Total				14,748.00
C	Interest / Lease / Insurance Cost				
1	Interest cost for crop loan	Days	4%	270	956.97
2	Land Lease cost	Season/Yr	1	5000	5,000.00
3	Insurance	Season	1	2200	2,200.00
	Sub Total				8,156.97
	Total Production Cost				40,498.97

D	Production				48.00
E	Marketing Cost				
1	Transport to market	Load	1	2000	2,000.00
2	Loading	Bag	96	5	480.00
3	Unloading	Bag	96	5	480.00
4	Commission to trader	Freq	2	300	600.00
5	APMC Tax				
	Sub Total				3,560.00
F	Market Rate				1,100.00
	Revenue				52,800.00
	Total Cost of sale				44,058.97
	Net Income				8,741.03
	Net Income / quintal				182.10
	BC Ratio				1.20

- The composition of the cost of sale revealed that the material input cost is highest, which is 1/3rd of selling price followed by labour input (27.93%), credit/lease/insurance cost (15.45%) and marketing cost (6.74%).
- Net margin to the producer is about 16.55% of the cost of sale.

Cost of sale composition of maize cultivation in ha of land is as under:

Table 5.3 Summary of the cost of sale composition of the maize cultivation in Bihar

S. No.	Particulars	Amount (Rs.)	Amount (Rs.) per quintal	%
1	Material Input	17594.00	366.54	33.33
2	Labour Input	14748.00	307.25	27.93
3	Credit / Lease / Insurance	8156.97	169.94	15.45
4	Marketing Cost	3560.00	74.17	6.74
5	Net Margin	8741.03	182.10	16.55
	Selling Cost by producer	52800.00	1100.00	100.00

Primary traders

- Primary traders are those who collect the produce/commodity from producers.
- There are different types of primary traders -village collectors, farm gate purchasers, primary traders at the block level and district level.
- However, their function remains the same which is the aggregation of the commodity from farmers.
- Commission agents form a link between farmers and traders. The commission agent takes approximately 1.5 percent of the sale value.
- Traders and collectors make their livelihood based on volumes traded, rather than on margins.

Fig 5.1 : Price Spread of maize production in one hectare

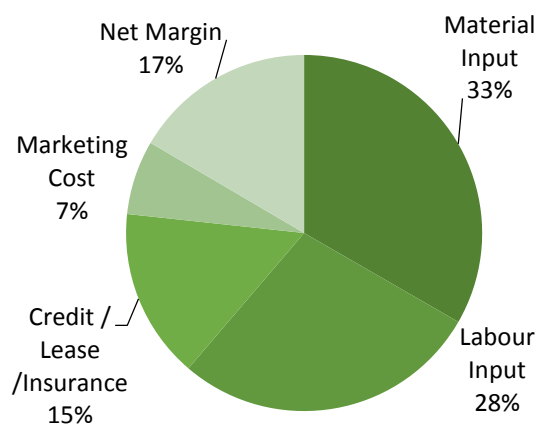


Fig 5.2 : Cost & Margin of maize - wholesaler

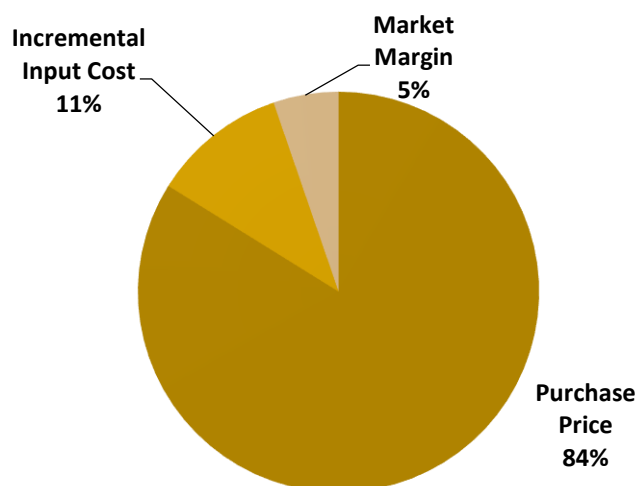
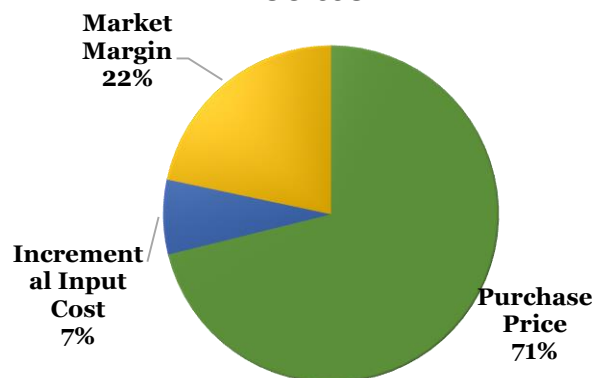


FIG 5.3 : COST & MARGIN OF MAIZE - PROCESSOR



- Margins for traders are ₹1-2 per kilo or sometimes even less depending on sale value and quality.
- Quality is an important parameter based on which rates are decided; important quality parameters being moisture content, foreign material content, size and colour of maize.
- The best quality maize, with optimal moisture percentage and low broken/damaged grain content, attracts a premium.
- The income of a primary trader from the trade of 1 quintal is about ₹ 1.41 per kg.

Table 5.4: Cost and Margin of Maize – Primary Trader

S. No.	Primary Trader	Unit	No of Unit	Unit Cost	Amount
1	Purchase Cost	Quintal	1	1100	1100.00
2	Drying losses @1%				11.00
3	Drying cost	Quintal			2.00
4	Transportation	Quintal	1	20	20.00
5	Loading	Bag	2	5	10.00
6	Unloading	Bag	2	5	10.00
7	Mandi Fees				3.00
8	Interest on working Capital	Days	7	13.50%	2.85
	Total Cost				1158.85
9	Sale price	Quintal		1300	1300.00
10	Margin of Primary trader				141.15

Wholesaler

The basic function of wholesalers is to trade in large quantities and supply the commodity to processors and exporters. Warehousing facilities play a key role in the wholesale business. It allows the wholesaler to store excess commodity and control supply of commodities as per market demands. The wholesaler supports different processors through the timely supply of maize for ensuring the quality of the commodity in the market.

The wholesaler can undergo storage losses up to 2% and also pays for the loading charges. Interest on working capital for the wholesaler is at 13.5% for 75 percent of commodity value. Wholesalers invest 25-30 percent of the total investment needed for the business from their own funds while the rest is a loan from nationalised or private sector banks.

Table 5.5: Cost and Margin of Maize – Wholesaler

S. No.	Wholesaler	Unit	No of Unit	Unit Cost	Amount
1	Purchase Cost	Quintal	1	1300	1,300.00
2	Loading	Bag	2	5	10.00

3	Commission Agent Charges				50.00
4	Storage and Fumigation etc.				50.00
5	Storage Losses @2%				26.00
6	Interest on working Capital for 75% of commodity	Days	90	13.50%	32.46
	Total wholesaler Cost				1,468.46
9	sale price	Quintal	1	1,550	1,550.00
10	Margin of Primary trader				81.54

Processing and Processor

- Maize is processed for different purposes.
- Cattle feed, bird feed, starch extraction, maize oil extraction, popcorn making, maize floor, canned sweet corn and sweet corn soup, canned baby corn, corn flakes and ethanol are important products produced processing of from maize.
- Feed processing is the most popular in India with 61 percent of maize produced being used for feed processing.
- Distillers dried grains (DDGS) and distillers' wet grains (WDGS) are major products used as feed products. DDGS is more popular in poultry.
 - "DDGS is the product after the removal of ethyl alcohol by distillation from the yeast fermentation of a grain or grain mixture by condensing and drying at least three-quarters of the solids of the resultant whole stillage by methods employed in the grain distilling industry. "
- The important products of dry distillations are dry distillers' gains, wet distillers grains, condensed distillers soluble.

Table 5.6 : Cost and Margin of maize – Processor

S. No.	Processor	Unit	No of Unit	Unit Cost	Amount
1	Purchase Cost	Quintal	0.66	1,550	1,023.00
2	Purchase of other raw material	Quintal	0.44	1,200	528.00
3	Material cost				1,551.00
4	Transportation	Quintal	1	100	100.00
5	Unloading	Bag	2	3	6.00
6	Storage, energy, Processing cost	Bag	2	7.5	15.00
7	Packing cost	Bag	2	15	30.00
8	Interest on working Capital for 45% of commodity	Days	30	13.50%	5.11
	Total Cost				1,707.11
9	Dealer Price	Quintal	1	2,150	2,150.00
10	Sale of by products	Quintal	0.06	500	30.00
	Revenue				2,180.00
	Processor's Margin				472.89

Dealers

Dealers are bulk handlers of product, their main function is to store the product, transport it to the retailer and facilitate business for the processor. The dealer's cost and margins are as detailed in the below table.

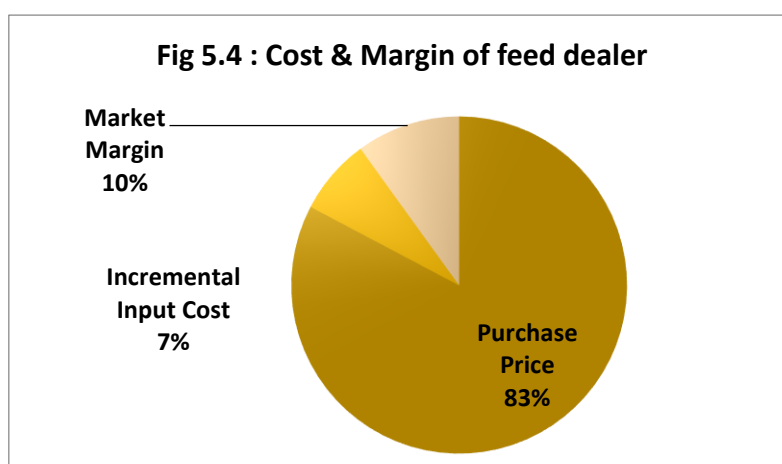


Table 5.7: Cost and Margin of maize – Dealers

S. No.	Feed Dealer	Unit	No of Unit	Unit Cost	Amount
1	Purchase price	Quintal	1	2150	2150.00
2	Transportation	Quintal	1	100	100.00
3	Unloading	Bag	2	3	6.00
4	Storage cost	Bag	2	4	8.00
5	Losses @%				52.00
6	Interest on working Capital	Days	30	13.50%	23.86
	Total Cost				2339.86
	Retailer Price	Quintal	1	2600	2600.00
	Processor's Margin				260.14

The dealer's margin is 2.60 per quintal on a purchase price of Rs 2,150 per quintal and a selling price of Rs 2600. The costs at the dealer level are transportation, unloading, storage, losses and interest on working capital.

Retailers

Every dealer is associated with retailers. The retailers carry the stock, display product, provide advisory to consumers as well as educate the customers about the new products. Retailers have reached to the remote and rural areas and they hold responsibility for brand development and establishment.

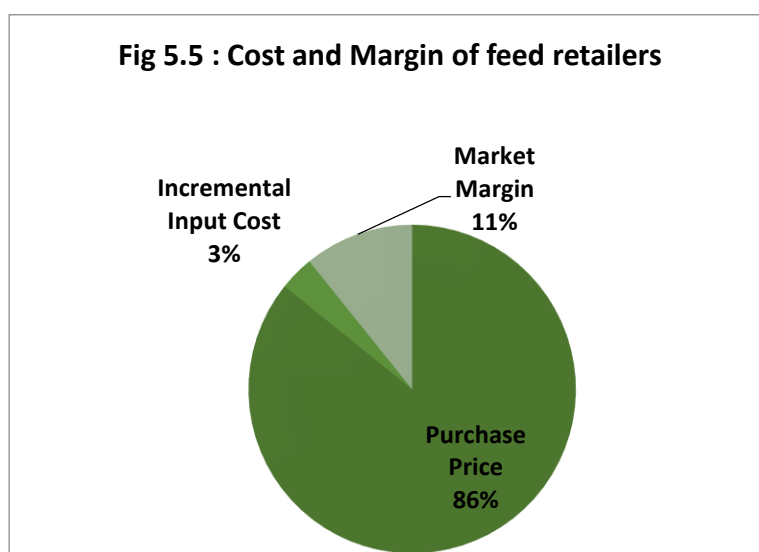


Table 5.8: Cost and Margin of maize – Retailers

S. No.	Feed Retailers	Unit	No of Unit	Unit Cost	Amount
1	Purchase price	Quintal	1	2600	2600.00
2	Unloading	Bag	2	3	6.00
4	Storage cost	Bag	2	4	8.00
5	Losses @%				60.83
6	Interest on working Capital	Days	30	13.50%	28.85
	Total Cost				2703.68
	Retailer Price	Quintal	1	3031.67	3031.67
	Retailer's Margin				327.99

FIG 5.6: Distribution sale cost among the various actors of supply chain

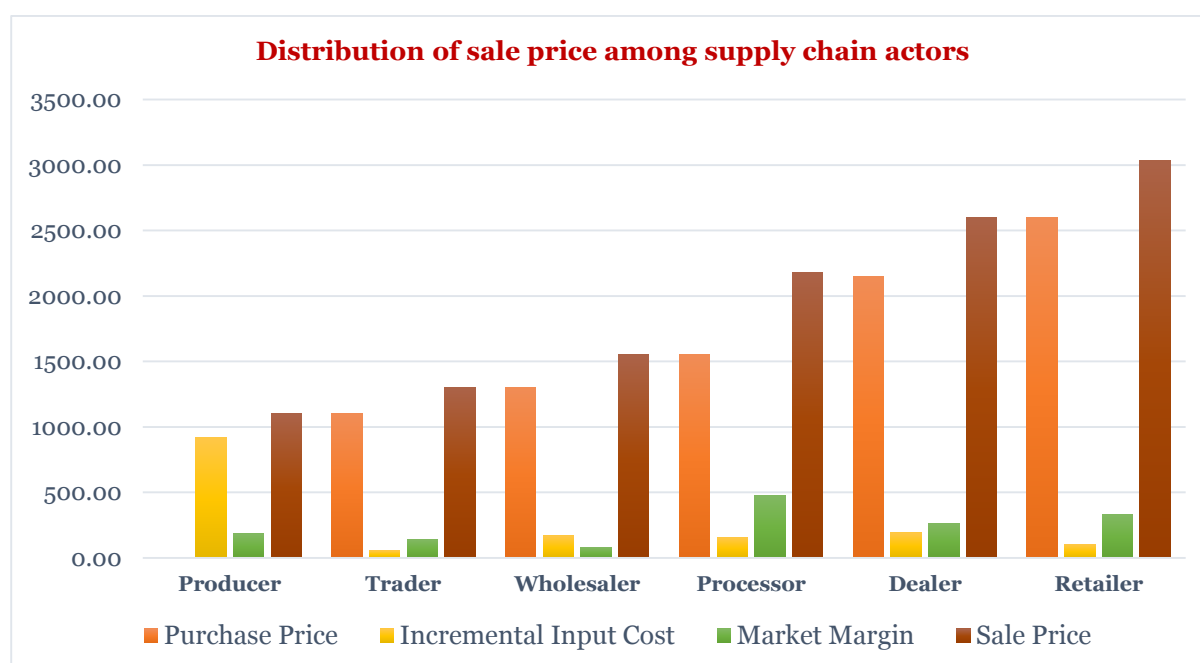


Table 5.9 : Cost and Margin of maize – Value chain actors

S. No.	Particulars	Producer	Trader	Wholesaler	Processor	Dealer	Retailer
1	Purchase Price	0.00	1100.00	1300.00	1551.00	2150.00	2600.00
2	Incremental Input Cost	917.90	58.85	168.46	684.11	189.86	103.68
3	Market Margin (MM)	182.10	141.15	81.54	472.89	260.14	327.99
4	MM (% of Cost of sale)	17.00%	11.00%	5.00%	17.00%	10.00%	11.00%
5	Sale Price	1100.00	1300.00	1550.00	2708.00	2600.00	3031.67
6	Return on investment	20.00%	12.00%	6.00%	21.00%	11.00%	12.00%
7	Return on incremental investment	20.00%	240.00%	48.00%	69.00%	137.00%	316.00%
8	Sharing of Risk	Very High	Low	Medium	Medium	Low	Medium
9	Ranking in sharing of profit	6	3	5	4	2	1

- Incremental input cost of the maize is the highest for the producer (43%).
- A Processor gets the highest market margin in terms Rs. per unit weight followed by the retailer, dealer, producer, trader and wholesaler.
- The Market margin of the producer in the cost of sale is equivalent to the processor (17%) followed by trader and retailer (11%) and the least to the wholesaler (5%).
- The producer has the highest risk in the supply value chain followed by the processor, retailer, wholesaler and trader.
- Vertical linkages from farmers to traders and farmers to input support are more personnel and less institutional in nature.
- Market volatility, quality, payments (forward and backward linkages), infrastructure support system, availability of credit support to small and marginal farmers are the major issues and constraints for the maize value chain.
- High *search, screening, bargaining, transfer/monitoring and enforcement costs* are also a hurdle for the efficiency and effectiveness of the supply chain for value chain actors.
- Lack of trading regulations, low transparency and lack of proper infrastructure in the mandi affects the supply chain.

Break Even point and viability for the producer:

- The break-even point for the cost of sale depends primarily on the sale price and productivity of the maize. For a given sale price of the maize @ Rs.1100 quintal per ha, breakeven productivity is coming to 40 quintal per ha. Hence, the business of production of the producer is found to be economically generally not viable in the prevailing agri-value chain.

Solution for the producer:

- Enhancement of the economic rent of the producer is only possible through the participation of the producer(s) in the prevailing agri-value chain which will enable them to get an opportunity to reap the ***other actors' market margin of the cost sale, which is presently 87%.***

Table 5.10: Distribution of market margins among value chain actors (Rs. / quintal)

Actor	Purchase Price	Marketing Cost	Market Margin	Sale Price	Market Margin (%)
Input supplier	550	50	25	625	2.04%
Producer	625	275	200	1,100	16.33%
Primary Trader	1,100	100	50	1,250	4.08%
Wholesaler	1,250	200	100	1,550	8.16%
Processor	1,550	300	400	2,250	32.65%
Dealer	2,250	250	200	2,700	16.33%
Retailer	2,700	200	250	3,150	20.41%
Total		1,375	1,225		100.00%

Fig 5.7 : Distribution of Market Margins among existing value chain actors

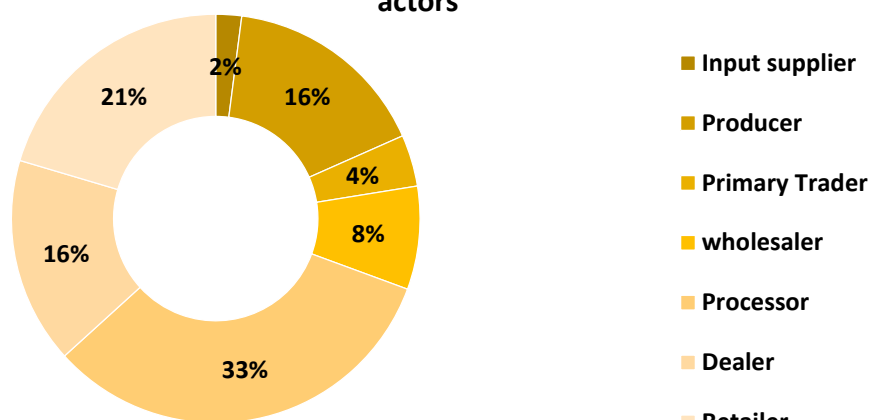


Table 5.11: Opportunity for the FPOs by undertaking role of different value chain actor/s

S. No.	Role of Value Chain Actor by FPO	Estimated increase in Market Margin
1	As an Input Supplier	Market margin of producer can be increased by Rs.25/quintal
2	As a Primary Trader	Market margin of producer can be increased by Rs.50/quintal
3	As a Primary Trader and Wholesaler both	Market margin of producer can be increased by Rs.150/quintal
4	As a Primary Trader, Wholesaler and Processor	Market margin of producer can be increased by Rs.550/quintal
5	As a Primary Trader, Wholesaler and Processor along with input Supplier	Market margin of producer can be increased by Rs.575/quintal

Chapter 6: Banana

The Agricultural Value Chain - Fruit

6.1 Introduction

- Banana is cultivated in India in an area of 830.5 thousand ha and total production is around 29,779.91 thousand tons.
- The main banana growing states are Tamil Nadu, Maharashtra, Gujarat, Andhra Pradesh and Karnataka.
- The global production of banana is around 102028.17 thousand tons of which India contributes 29.19%.

6.2 Aggregation of Inputs: Value Chain Approach

First of all we have to understand the input management segment i.e. effect of the land holding size on unit cost various inputs which will give the direct relationship between the aggregation of inputs and change in the cost of cultivation. Here, we have determined the various cost of inputs for marginal, small and large farmers respectively as indicated in Table 6.1.

Table 6.1: Effect of land holding size on the cost of cultivation (Rs./acre) of the Banana
(Text Colour: increases - red and decreases – green)

Particulars	Marginal Farmers	Small Farmers	Large Farmers	Overall	Change Col (2) - (4)	Increase in Input Cost	Decrease in Input Cost
1	2	3	4	5	6	7	8
Land Preparation							
Bullock	400	62.5	18.89	50	-381.11		-381.11
Machine	1,446	1,246	1,869	1,709	423	423	
Hoeing	1,362	1,008	1,138	1,122	-224		-224
Digging Pit	4,285	2,983	3,518	3,444	-767		-767
FYM	1,938	2,086	2,615	2,462	677	677	
Plantlets	4,300	2,841	3,650	3,509	-650		-650
Plant Treatment	604	468	515	509	-89		-89
Fencing	19,385	18,410	13,631	14,998	-5,754		-5,754
Planting	1,823	1,350	1,616	1,569	-207		-207
Fertilizer Application	4,838	4,385	7,862	6,931	3,024	3,024	
Micronutrients Application	640	718	2,333	1,934	1,693	1,693	
Inter-culture	746	764	995	931	249	249	
Weeding	1,684	1,018	905	974	-779		-779

Mulching		648	486	494	486	486	
Desuckering	630	489	724	580	94	94	
Plant Protection	451	914	873	858	422	422	
Irrigation	1,865	2,136	2,781	2,589	916	916	
5 Propping	11,739	9,528	8,572	8,958	-3,167		-3167
Watching		1,172	2,348	1,959	2,348	2,348	
Harvesting	3,260	2,918	2,283	2,477	-977		-977
Mattocking	1,969	2,000	2,198	2,142	229	229	
Ripening	185	111	125	123	-60		-60
Total Cost	63,550	57,256	61,056	60,322	-2,494.11	10,561	-13,055.11
Yield	19,494	19,410	21,129	20,661			
Price	11.67	12.42	11.74	11.95			
Total Revenue	220,126	240,733	248,105	244,932			
BC Ratio	3.46	4.2	4.06	4.06			
Labour Component	19,734	15,797	19,136	18,488			

(Amount in Rs.)

Table 6.2: Aggregation by the FPO - major inputs in Rs.

Inputs	Marginal Farmer	Small Farmer	Large Farmer	Change in Input Cost
Farm Mechanization	15,006	11,349.5	12,343	-2,663.11
Plantlets	4,300	2,841	3,650	-650
Fertilizer + Nutrients	5,478	5,103	10,195	4,717
Plant Protection	1,055	1,382	1,388	333
Propping	11,739	9,528	8,572	-3,167
Fencing	19,385	18,410	13,631	-5,754

- From above table 6.1 it is observed that when we move from small holdings to large holdings the cost of cultivation is reduced from Rs.63,550 to Rs.61,056 per acre registering a 3.92% reduction in the cost of cultivation.
- There are two groups of inputs. The cost of one group of the inputs increases with an increase in land holding whereas in the second group cost of inputs decreases with increase in landholding.
- However, in aggregate terms, there is a reduction in the cost of cultivation moving from marginal farmers to large farmer as a classification.
- Not only is there an increase in the yield, the price of realization too increases leading to an increase in the total revenue.
- Three sub sectors are to be intensely examined while analysing the cost of cultivation. One is the opportunity to **“reduce the cost of cultivation”**, second is the **“enhancement of the productivity”** and the third one is the **“increased farm gate price”**.
- **Important parameters observed generally as regards** the input value chain :

- Marginal farmers being resource poor might have attempted to use more female labour because of a lower wage rate.
- Quantity of FYM used varied according to size.
- Fertilizer use per acre is generally 2.37 quintals by the small farmers while large farmers use 4.71 quintals
- Use of micro-nutrients also varies from 4.77 kg by marginal farmer to 17.6 Kg by large farmer with overall quantity of 14.3 Kg. (are these per acre figures?)
- For suckering operation utilization of kerosene is 1.5 litres by the medium farmers while it is 7.5 litres by the large farmers
- Digging costs, which constitute about 5.7% of the cost of cultivation vary from Rs.5 to Rs.8 per pit. Farmers use either daily wage labour or contract labour for digging; most farmers prefer the latter option as it is cheaper.
- On the basis of the above analysis we can identify the activities which have the potential to be aggregated and managed more effectively and economically through the business operations of an FPO.

The following activities have opportunities for cost reduction:

Hoeing	Fencing	Propping
Digging pits	Planting	Harvesting
Plantlets	Weeding	Ripening
Plant Treatment	Mulching	

Potential savings are shown in figure 6.1.

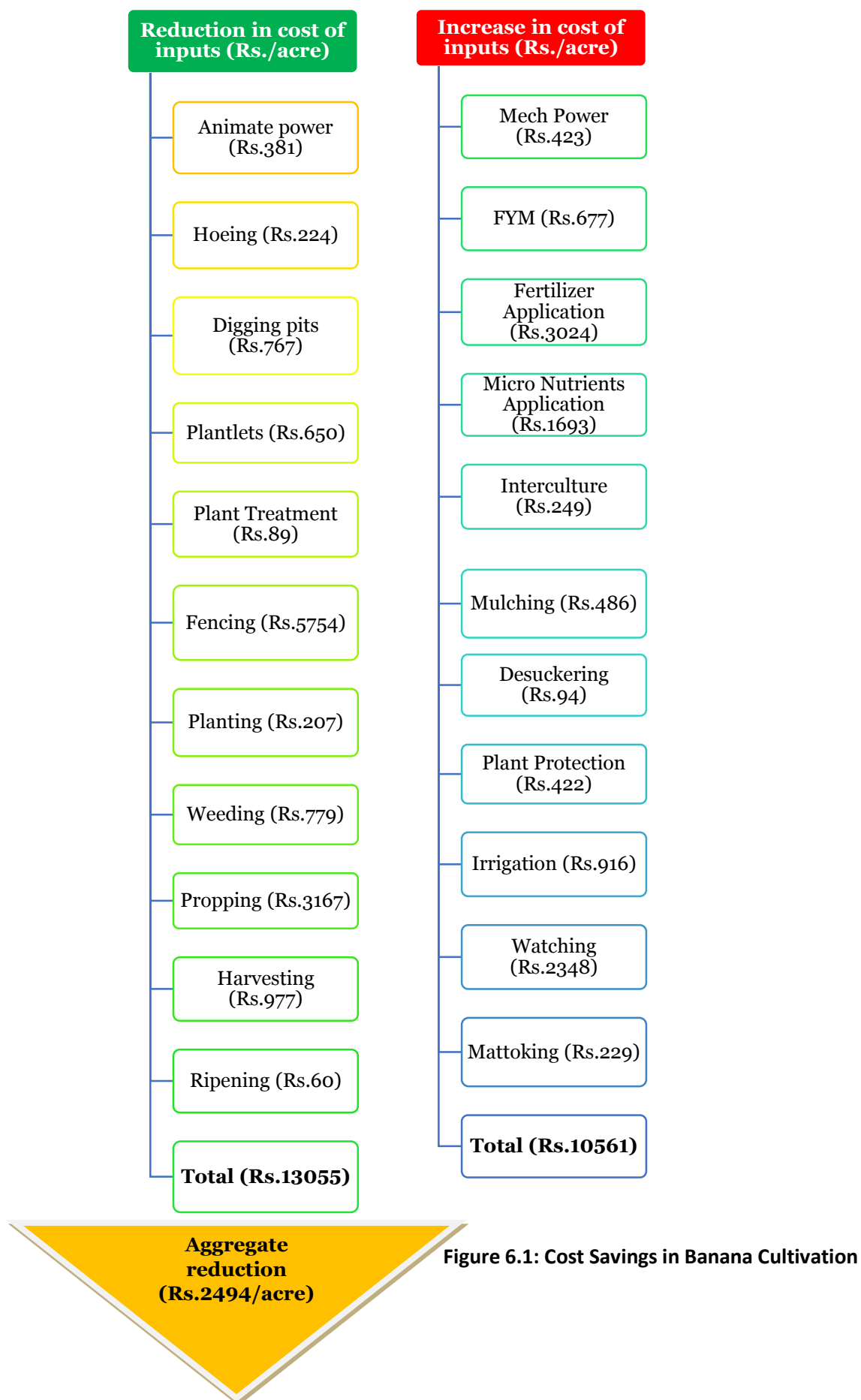


Figure 6.1: Cost Savings in Banana Cultivation

6.3 Aggregation of the Inputs Business Model for a FPO

- Custom and hiring model of mechanization / establishment of farm machinery centres to cover primary and secondary tillage operation, digging, plant treatment, plantation, intercultural operation, harvesting and transport.
- Besides, the aggregate procurement of various inputs such as plantlets, fertilizers and nutrients, plant protection measures, propping material and fencing material etc., as illustrated in Table 6.2.

Table 6.3 Economics of aggregation of major inputs for 1 Ha

Inputs	Average Expenditure (Rs./Ha)	Approximate Market Margin (%)	Total Margin (Rs./Ha)
Farm Mechanization	30322	8	2426
Plantlets	8667	5	433
Fertilizer + Nutrients	21897	2	438
Plant Protection	3376	15	506
Propping	22126	5	1106
Fencing	37045	5	1852
Total	123433		6761

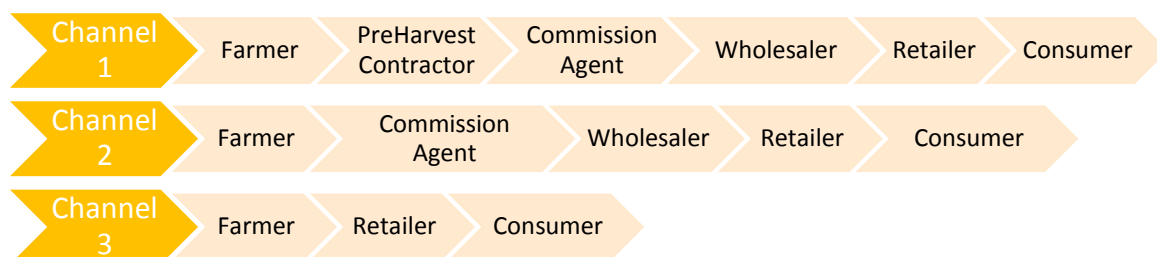
Table 6.4 : FPO - The Potential under an aggregation model of an input business and marketing margins

No of Farmers (FPO Size)	Area (Ha)	Potential Business (Rs. in lakh)	Market Margin in Inputs (Rs. In lakh)
100	85	104.92	5.75
300	255	314.75	17.24
500	425	524.59	28.73

Optimization Technique for other inputs: For some of the inputs where there is an increase in the cost of inputs such as machine use, FYM, fertilizer applications, micro nutrients application, intercultural operation, desuckering, plant protection, irrigation, weeding, and mattocking there is a need to optimize the inputs by proper agronomical measures and through better technical inputs.

6.4 Collective Marketing: Value Chain Approach

While analysing the share of various stakeholders in the agri-value chain of the banana crop, it is observed that the number of the players is 3 to 7 starting from the farmers and ending with the consumer depending upon the type of the marketing channels which could be as under:

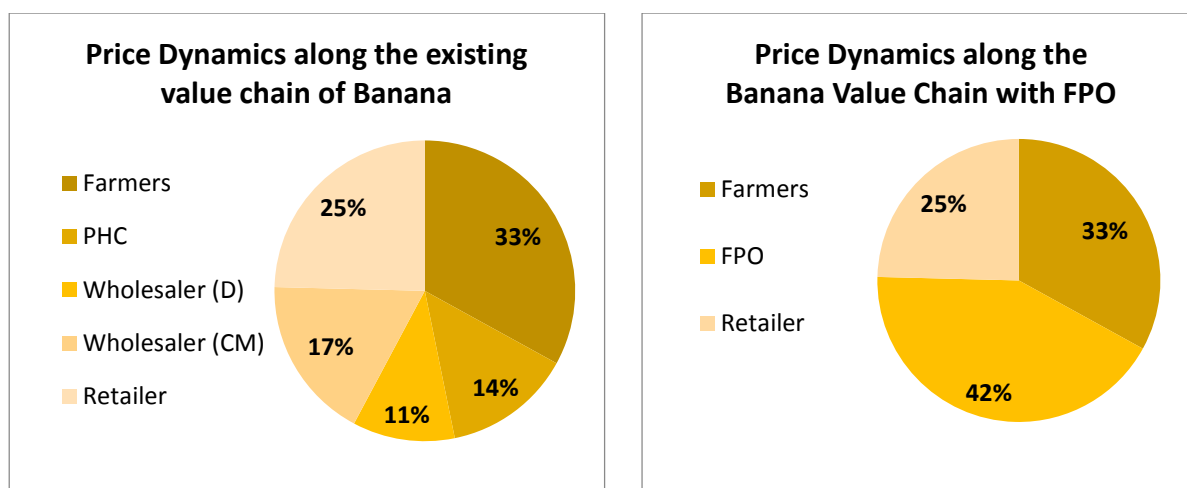


- **Farmers:** Banana farmers generally don't sell their produce to consumers directly. They usually give out their whole plot on contract which affects their profitability ratio.
- **Pre-Harvest Contractor:** The contractor enters into pre-harvest contracts or purchases the entire produce from the orchard and supplies the produce to the main market. For this process he has to bear the cost of cultivation, lifting the banana - bunch cost, transportation cost and market fees.
- **Wholesaler (At Distribution Market):** The Wholesaler at the distribution market purchases the banana from the pre-harvest contractor and sells it to the sub wholesaler / wholesaler (at consumer market) for which he incurs two types of expenses - wastage expense and market fees.
- **Wholesaler (At Consumer Market):** The wholesaler operates in the consumer market. He ripens the banana and supplies it to different retail outlets. In this process he incurs the cost of ripening, wastage cost and lifting.
- **The Retailer** purchases the ripe banana from the wholesaler (at consumer market) and sells it to consumers. At this stage transportation and wastage costs are incurred. Wastage cost is relatively high at this stage. If the retailer is not able to sell the ripened banana as early as possible he runs the risk of his stock getting spoiled.

Table 6.5: Market Price and the Cost of a typical banana marketing chain Rs. per quintal.

1	Price Received to Farmer		825
2	Market cost paid by Farmer		0
3	Net price received from pre-harvest contractor		825
4	Pre-harvest contractor (on side)		225
	Harvesting Cost	35	
	Collection and Loading Cost	25	
	Travelling Cost	80	
	Wastage Cost	50	
	Market Fee Cost	35	
	Total Cost	225	
5	Profit of Pre-harvest contractor		120
6	Net price received from pre-harvest contractor		1170
7	Wholesaler cost (Distribution Market)		110
	Wastage Cost	50	
	Loading and Marketing Fee	60	
	Total Cost	110	
8	Profit of wholesaler (Distribution Market)		165
9	Net price received from wholesaler (Consumer Market)		1445
10	Wholesaler cost (Consumer Market)		260
	Wastage Cost	120	
	Banana Ripening Cost	80	
	Loading & Travelling Cost	60	
	Total Cost	260	
11	Profit of wholesaler (Consumer Market)		180
12	Net price received from retail		1885
13	Retailer		380
	Travelling Cost	115	
	Wastage Cost	265	
	Total Cost	380	
14	Profit to Retailer		235
15	Net Price received from Consumer		2500

- While analysing the value chain regarding the marketing of banana, it is observed that there are generally six players involved post harvest.
- In the existing value chain farmers are getting 33% of the consumer price of the banana.
- The business participation or rather share of the remaining stakeholders such as the Post Harvest Contractor (PHC), Wholesaler (Distribution), Wholesaler (Consumer Market), and Retailer is normally 14%, 11%, 17%, and 25%.



6.5 Estimated gross margins for the different stakeholders

On the basis of above price spread, considering without and with FPO , the estimated gross margin for an FPO has been worked out for 100 members with 85 ha under cultivation, 300 members with 255 ha under cultivation and 500 farmers with 425 ha under cultivation. The estimated gross margins of different stakeholders and the gross margin present an opportunity for FPOs as below:

Table 6.6: Stakeholders wise business participation under Banana Marketing Channel (Rs. in lakh)

No of Farmer	Area (Ha)	Yield (q)	Farmers	PHC	Wholesaler - Distribution Market	Wholesaler Consumer Market	Retailer
100	85	42,500	351	147	117	187	261
300	255	127,500	1,052	440	351	561	784
500	425	212,500	1,753	733	584	935	1307

It is observed that annual gross margin of the FPOs consisting of a membership of 100 (Case I), 300 (Case II) and 500 (Case III) with total land holding size of 85 ha, 255 ha and 425 ha have the opportunity and potential to earn Rs. 147 lakh to Rs. 451 lakh, Rs. 440 lakh to Rs. 1,352 lakh and Rs. 733 lakh to Rs. 2,252 lakh, respectively depending upon the levels of the business participation starting from *Post Harvest Contractor* (PHC) to *Wholesaler* (Consumer Market).

Price spread of the net margin for banana cultivation and marketing

After deducting the cost of cultivation from the farm gate price and the cost of various activities, value additions, services and wastage, the net margin of each stakeholder has been analysed and is presented and illustrated in Table 6.7.

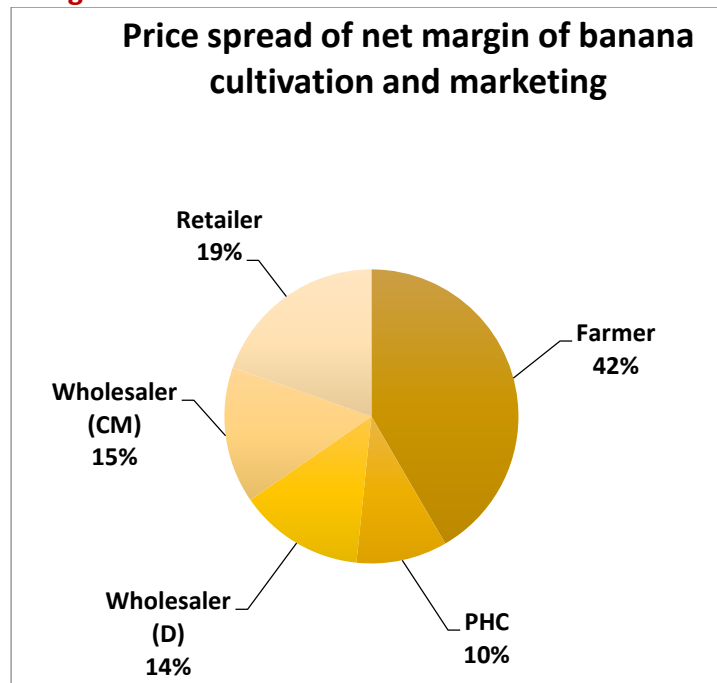
Table 6.7 and Fig: Price spread and net margin of different Stakeholders

Players	Net Margin (Rs./q)
Farmer	499.00
PHC	120.00
Wholesaler (D)	165.00
Wholesaler (CM)	180.00
Retailer	235.00
Total	1,199.00

PHC : Post Harvest Contractor

D : Distribution

CM : Consumer Market



For the three models of farmer groups comprising 100 farmers (85 ha), 300 farmers (255 ha) and 500 farmers (425 ha), the income (net margin) of the farmers can be enhanced from the existing level of Rs.212 lakh to Rs.410 lakh, Rs.636 lakh to Rs.1229 lakh and Rs.1060 lakh to Rs.2049 lakh, respectively depending upon the extent of business participation by the FPO which is 93% over and above the existing farm gate price realization to the farmer (*almost doubling the income*).

Table 6.8: Potential of enhancement of the income through an FPO (Rs. in lakh)

No of Farmer	Area (Ha)	Yield (q)	Farmers	PHC	Wholesaler (D)	Wholesaler (CM)	Retailer
100	85	42,500	212	51	70	77	100
300	255	127,500	636	153	210	230	300
500	425	212,500	1,060	255	351	383	499

Chapter 7: Poultry

The Value Chain - An Agriculture Allied Activity

7.1 Introduction

- This sector employs over 3.0 million people.
- At least 80% of the employment in the poultry sector is generated directly by farmers, while 20% of the total employed are engaged in allied activities like feed production, pharmaceuticals, equipment etc.
- Additionally there may be a similar number of people engaged in marketing and other channels servicing the poultry sector.
- It is also estimated that for an increase in the per capita availability of one egg or 50 gms of poultry meat, an additional 20,000-25,000 job opportunities are created.

7.2 Issues of poultry value chain

- Village based and scale intensive; both types of production system prevail in India and are being supported through policy measures.
 - A substantially increased public investment is required for *institutional development that overcomes disproportionately high transaction cost that small-holders face in securing quality input & market access.*
- Institutional mechanism needed for “skills infusion”
 - National Poultry Development Board (on the lines of NDDB, NFDB) needs to be set up *to create structured impetus, orchestrate PPP ventures and leverage the inherent strength & dynamism of the sector*
 - The Missing “voice” issue: This activity contributes (Rs. 35,000 crore) more than sugarcane (Rs.25,776 crore), 70 % of fisheries (Rs.49,891 crore) – yet there is no *strong poultry farmer lobby*
- Processed Chicken– build missing infrastructure, rationalise taxation, recognise challenge is both “category conversion” and “product”
- Create and ground “poultry-centred diversified farming systems” –increase mean household income, reduced variability, smoothen lumpy farm income flows
- Provide Insurance Cover – on lines of “live-stock insurance”
 - Optimise production systems for inaccessible regions like NE
 - Indigenise feed resources reducing production cost

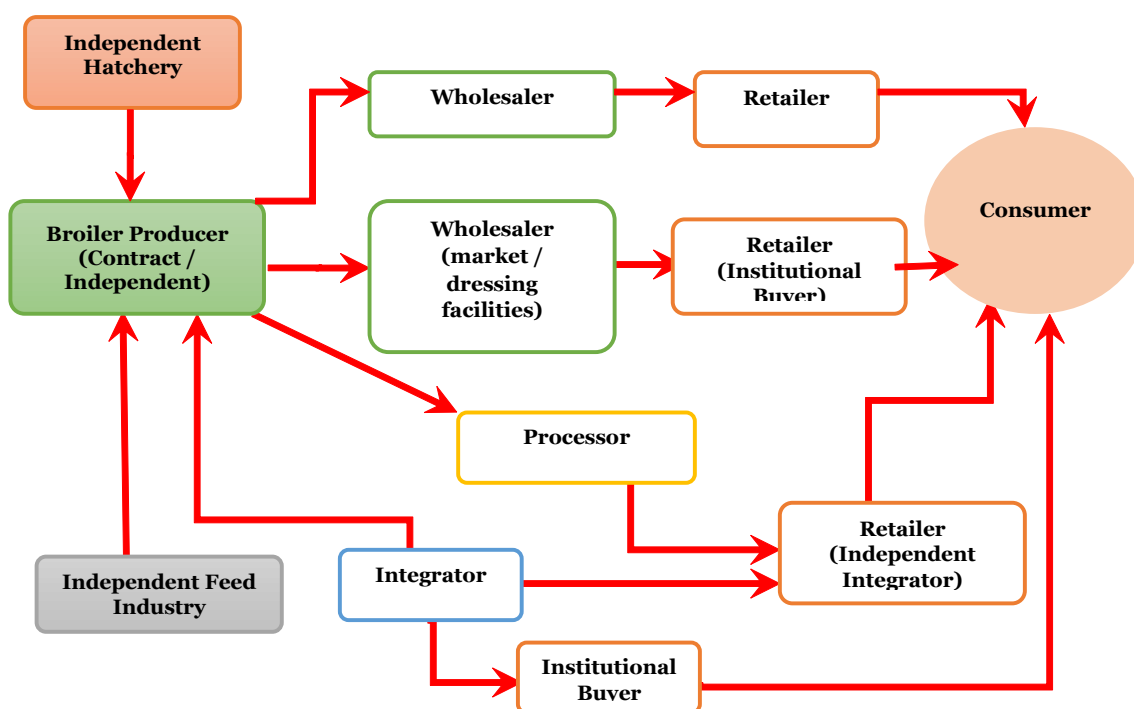
7.3 Making the Poor Participate

1. Coexistence of Commercial (high input & high output) & Non Commercial (low-input & low -output) poultry farming
 - Tribal areas, low poultry developed areas – reach of modern poultry is difficult
 - Geographic Space: more than 60% of eggs are produced in AP, Maharashtra, Punjab, Haryana, TN and over 60% poultry meat is produced in AP, Maharashtra, Punjab, Karnataka and West Bengal.
 - Space and relevance in household livelihoods systems is much higher particularly for landless - 10-20 % of total household income
 - Leverage Rural Urban Divide in Consumption – 100 eggs per capita per annum in urban to 15 eggs in rural areas, similarly 2.1 kg poultry meat in urban areas to 0.15 kg in rural areas. 95% of the poultry meat is in wet market (fresh produce markets) with strong cost implications of transporting large distances
2. Institutional Mechanism for pro-poor vertical integration, contract farming/cooperative farming – match the shift in structure & operation of industry

Being an important agriculture-allied sector especially for small and marginal farmers and landless farmers, it is important to understand the functioning of the value chain and assess the extent of the opportunity for the famers and their FPOs by engaging in business through the aggregation of inputs and collective marketing to the economy of the scale by the strengthening, modification and improvement of existing value chain and actors involved.

7.4 Aggregation of Inputs: Value Chain Approach

Fig 7.1 : Existing value chains of broiler poultry



The major **challenges** faced by the farmers engaged in broiler farming in the poultry sector are as follows:

- Lack of management skills for poultry
- High mortality due to poor animal health care in remote areas
- Poorly organized market channels
- Poorly organized technology transfer
- The low availability of technical personnel
- Poor farmers' commodity groups
- High cost of inputs

Issues

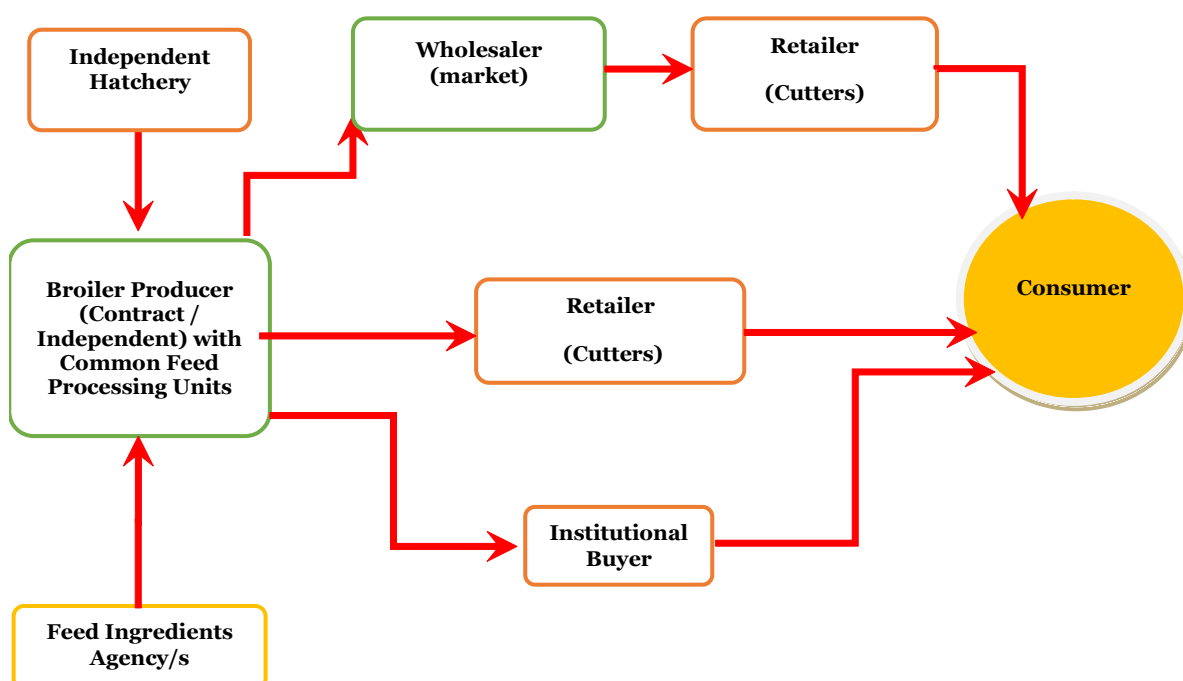
- Non availability of dual purpose breed at farmers' door step
- Lack of awareness of timely vaccination
- No facility for procurement and marketing by the government
- Lack of knowledge and skill in rearing chicks
- Occurrence of epidemic like bird flu
- Lack of suitable transport facility to distant markets

Opportunities

- Providing dual purpose breed by CDVO, KVK & Reputed farm
- Meat and Egg Marketing society could be encouraged at the district / cluster level
- Fixing of minimum support price by the Govt.
- Suitable transport facilities for meat & egg to distant places

Alternative collective poultry value chain model

Fig 7.2 : Alternative poultry value chains of broiler production



7.5 Opportunities to FPOs under alternative poultry value chains

- Collective purchase of day old chicks (DOC)
- Production of poultry feed through establishment of a feed mixing unit
- Veterinary aid through common consultancy services
- Procurement of medicines collectively
- Collective marketing by replacing the primary aggregator and direct supply to the wholesaler / retailers.

Table 7.1 Business margins by the aggregation of inputs and collective marketing

S. No.	Particulars	Assumptions
1	Procurement of (DOC)	Rs.1 per bird
2	Feed Mixing and Distribution	10% of the feed cost
3	Veterinary Consultancy	25% of the Consultancy Fees
4	Medicine	5%
5	Aggregate Marketing	Rs.5 per bird

Table 7.2: The Year-wise opportunity for gross margins by the aggregation of inputs and marketing

S. No.	Particulars	Amt (Rs./Kg)	Amt (%)	Gross Margin by Aggregati on. (Rs. / bird)	Opportunity of aggregation and collective marketing (Rs. in lakh)			
					I	II	III	IV
	Size in Thousand				50	100	200	500
1	DOC	17.02	23.97	1	0.5	1.00	2.00	5.00
2	Feed	43.83	61.72	9.42	4.71	9.42	18.84	47.1
3	Litter	0.52	0.73					
4	Labour	1.33	1.87					
5	Medicine	0.51	0.72	0.05	0.03	0.05	0.10	0.25
6	Electricity	0.29	0.41					
7	Disinfection	0.1	0.14					
8	Miscellaneous	0.12	0.17	0.06	0.03	0.06	0.12	0.30
9	Int Variable Cost	4.46	6.28					
	Total Variable Cost	68.18	96.01	10.53	5.27	10.53	21.06	52.65
10	Depreciation (Shed)	1.01	1.42					
11	Depreciation (Equipment's)	0.23	0.32					
12	Int of Fixed Cost	1.59	2.24					
	Total Fixed Cost	2.83	3.98					
	Total Cost	71.01	100.0	10.53	5.27	10.53	21.06	52.65

13	Marketing	78.59		5.00	2.50	5.00	10.0	25.00
	Grand Total			15.53	7.77	15.53	31.06	77.65

Table 7.3: The Summary of business opportunities on account of the aggregation of inputs and collective marketing

Year	Scale of economy (Aggregation of Birds)	Gross Market Margin (Rs in lakh)
I	50,000 birds	7.77
II	100,000 birds	15.53
III	200,000 birds	31.06
V	500,000 birds	77.65

The analysis of the table as above reveals that if any FPO undertakes business through the alternative poultry value chain with the selective aggregation of inputs and the direct marketing of broiler chicken to the retailer then the gross business of the FPO may vary from Rs.7.77 lakh to 77.65 lakh by the aggregation of produce under one umbrella from 50000 birds to 5,00,000 birds respectively, which is about 9% of the consumer price of broiler chicken.

Chapter 8: Inland Fisheries

The Value Chain of Agricultural Allied Sector

8.1 Introduction

- The Fisheries and aquaculture sector is considered a sunrise sector of the Indian economy.
- India has reached the status of 2nd largest producer of fish and 2nd largest producer of aquaculture in the world next only to China. India is home to more than 10 percent of the global fish biodiversity.
- It has witnessed a spectacular growth of over 1,800%, from 0.75 MMT to 14.20MMT, during the last seven decades.
- With a production of around 14.20 million tonnes during 2019-20, India accounts for about 7.56% of the global fish production.
- Inland fish accounted for 10.43 MMT which is 73.45% of the total fish production.
- It has been recognized as a powerful income and employment generator as it stimulates the growth of a number of subsidiary industries.
- It is an important source of nutritious food besides earning foreign exchange.
- Fishery being one of the promising sectors of agriculture and allied activities in India, the Government of India has come out with a Scheme for a Blue Revolution to focus on tapping the full production potential and enhance productivity substantially from aquaculture and fisheries resources with an anticipated growth rate of 6 % to 8% per annum.

8.2 Domestic Fresh Water Fish Market

SURPLUS		DEFICIT
AP*		DELHI
HARYANA		WB
RAJASTHAN		ORRISA
PUNJAB		JHARKHAND
WEST BENGAL		BIHAR
UP		CHHATISHGARH
MP		UP
CHHATISHGARH		MP

*Andhra Pradesh is the largest source of fish in many states of India

- Overall, there is a gap in demand and supply of fresh water fish in North and East India.
- There is surplus of fish in States like AP, Haryana, Punjab and Rajasthan.
- Overall the deficit in fresh water fish is met by AP.

- Neighbouring surplus states like Haryana, Punjab and Rajasthan cater to the requirement for fresh water fish in capital city of Delhi.
- There is very limited export of carps from Bengal in India to Bangladesh and also import of Hilsa from Bangladesh to West Bengal in India.
- Inland fish market in India has evolved on its own and has gained momentum.

8.3 Value chain analysis of inland fishery

Considering the coverage and importance of the agri-allied sector, other than dairy, which is already a mature activity, the fishery and poultry sector are the ones to tap. Hence and it is important to understand the functioning of their value chain and assess the extent of the opportunity for the famers and the FPOs they may organise so as to participate actively in the business of aggregation of inputs and collective marketing for optimising the economy of scale and to enable members to realise higher incomes.

Value Chain actors

Usually there are three to six players in the fisheries value chain, depending upon the type of prevailing marketing channels which are as under:

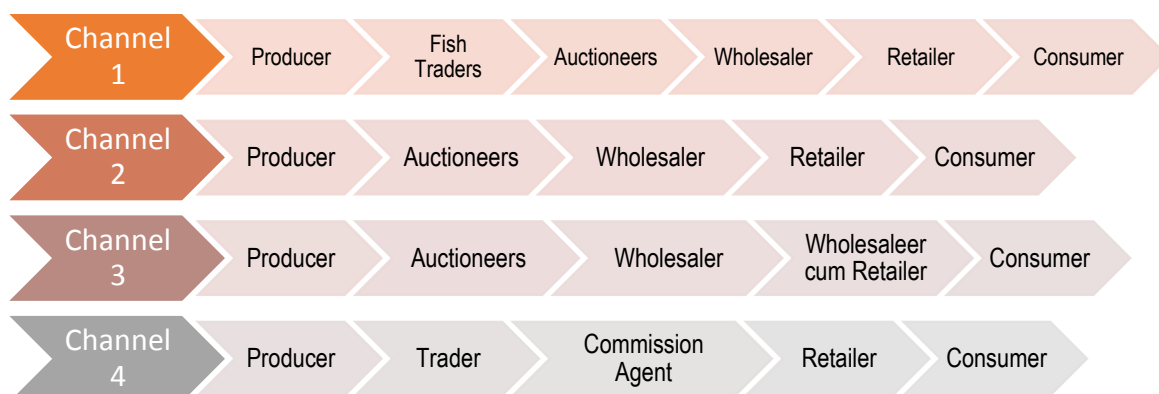


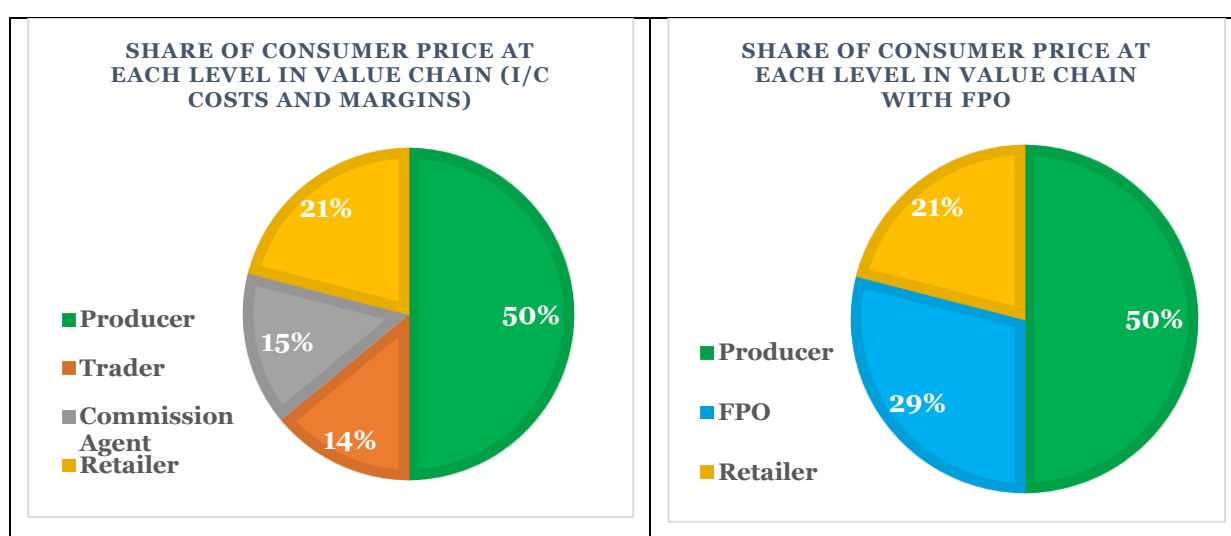
Table 8.1: Distribution of economic rent in the fish marketing value chain (Rs./Kg) under Channel IV

S. No.	Players	Economic Rent (Rs./Kg)	Value Addition (Rs./Kg)	% of Consumer Price
1	Producer	175.00	175.00	50.00
2	Trader			
	Margin	10.50		3.00
	ICE	3.50		1.00
	Handling	10.50		3.00
	Transport	24.50		7.00
	Sub Total	49.00	224.00	14.00
3	Commission Agent			
	Margin	10.50		3.00
	Transport	21.00		6.00
	Handling	10.50		3.00
	Rent and Interest	10.50		3.00
	Sub Total	52.50	276.50	15.00
4	Retailer			
	Margin	49.00		14.00
	Transport	14.00		4.00
	Ice	3.50		1.00
	Interest and Capital	7.00		2.00
	Sub Total	73.50	350.00	21.00
	Consumer Price	350.00		
	Total	350.00		100.00

- An analysis of the fish marketing chain reveals three players involved in the post harvest scenario.
- In the existing value chain farmers normally get 50% of the consumer price of the fish.
- The business participation of the remaining stakeholders such as Trader, Commission Agent, and Retailer is normally around 14%, 15%, and 21%, respectively.

Table 8.2: Price spread of inland fish marketing under existing and with FPO channel

Existing Channel		Marketing Channel with FPO	
Player	Price Spread (Rs./Kg)	Player	Price Spread (Rs./Kg)
Producer	175.00	Producer	175.00
Trader	49.00	FPO	101.50
Commission Agent	52.50	Retailer	73.50
Retailer	73.50		
Total consumer price	350.00		350.00



8.4 Estimated gross margins for the different stakeholders

On the basis of the above price spread, considering without and with the FPO, the estimated gross margin of FPOs has been worked out for community ponds with a size of 50 ha, 100 ha and 200 ha of wet water bodies. The estimated gross margins of different stakeholders and the gross margin as an opportunity for FPOs has been presented as below.

Table 8.3: Value chain actor - wise mapping of business potential (Rs. in lakh)

Area of Community Pond (ha)	Yield (q)	Producer	Trader	Commission Agent	Retailer
50	1,875	328.13	91.88	98.44	137.81
100	3,750	656.25	183.75	196.88	275.63
200	7,500	1,312.50	367.50	393.75	551.25

It is observed that the annual gross margin of the FPO with a coverage area of community ponds of 50 ha (Case I), 100 ha (Case II) and 200 ha (Case III) is having an estimated opportunity of Rs.91 lakh to Rs.190.32 lakh, Rs.183.75 lakh to Rs.380.63 lakh and Rs.367.50

lakh to Rs.761.25 lakh, respectively depending upon the levels of the business participation starting from the *Trader* to the *Commission Agent*.

8.5 Price spread of the net margin of Fish production and marketing

After deducting the production cost of the fish by the producer and the marketing cost of the different stakeholders, the net margin of the each stakeholders has been analysed and presented and illustrated as below -

Table 8.4: Price spread and net margin of different Stakeholders

Existing Channel		Alternative Channel with FPO	
Player	Price Spread (Rs./Kg)	Player	Price Spread (Rs./Kg)
Producer	65.00	Producer	65.00
Trader	10.50	FPO	21.00
Commission Agent	10.50	Retailer	49.00
Retailer	49.00		
Total Net Margin	135.00		135.00

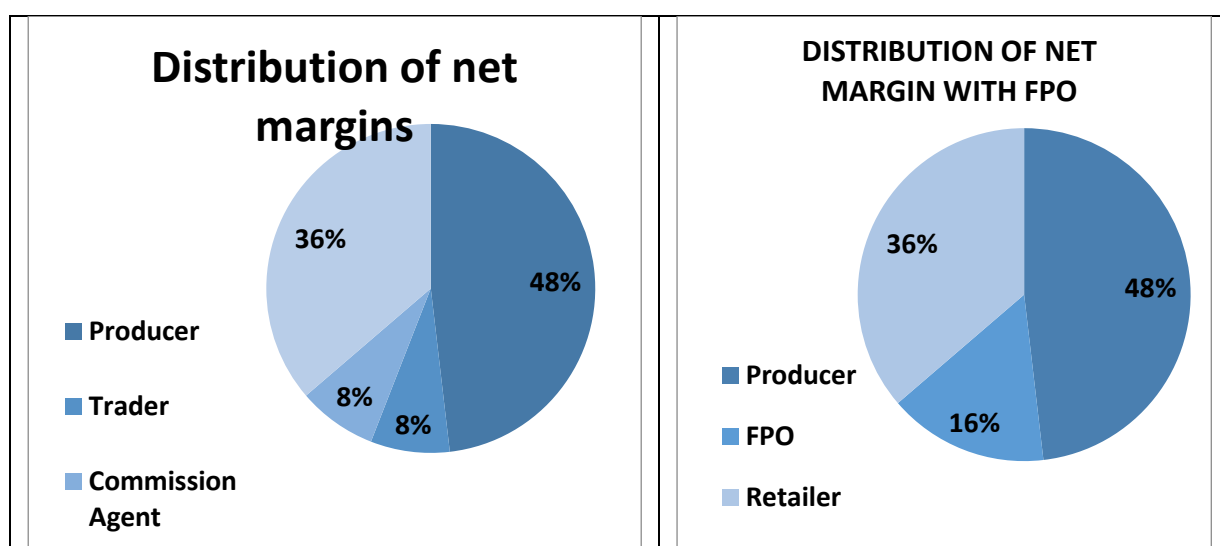


Table 8.5: Potential of enhancement of the income through an FPO (Rs. in lakh)

Area of Community Pond (ha)	Yield (q)	Producer	Trader	C. Agent	Retailer
50	1875	121.88	19.69	19.69	91.88
100	3750	243.75	39.38	39.38	183.75
200	7500	487.50	78.75	78.75	367.50

For the three models of producer groups having community ponds of 50 ha, 100 ha and 200 ha, the income (net margin) of the farmers can be enhanced approximately from the existing level of Rs.121.88 lakh to Rs.161.26 lakh, Rs.243.75 lakh to Rs.322.51 lakh and Rs.487.50 lakh to Rs.645.00 lakh, respectively depending upon the extent of business participation by the FPO which would be an estimated 32% over and above the existing farm gate price realization by the producers.

Chapter 9: Tomato

The Agricultural Value Chain - Vegetables

9.1 Introduction

- India produces 8% of the total tomato production of the world.
- It covers 14.6% of total area under cultivation of tomato in the world.
- India is the 2nd largest producer of tomato after China.
- The average production of the tomato was 25.47 MT/Ha during the year 2016-17. However, in some of the areas the yield goes up 50 MT to 54 MT/Ha.
- Average yields in open conditions are about 20.13 MT/Ha while under protected conditions the yield is around 44.08 MT/Ha.
- The average cost of cultivation in Northern India is about 35495 per acre which is equivalent to Rs.149 per quintal with an average production of 23.8 quintal per acre.
- The average selling price is about Rs.495 per quintal including the marketing expenses of Rs.130 per quintal which yields a net profit of Rs.133 per quintal to farmers.
- There are huge weight losses on account of the lack of post-harvest mechanization and infrastructure support system. Losses at different levels of the value chain actors as well as related activities are as under :

Table 9.1: Average post-harvest losses in tomato supply chain

Stages	Activities	Losses
Farm Gate	Cleaning, Grading, Weighing & Packaging	6.21%
	Post-Harvest Losses	4.80%
	Transport Losses	2.33%
Trader	Storage (Handling, Weighing, Loading & Delayed marketing)	3.40%
Wholesaler		6.89%
Retailers		8.63%

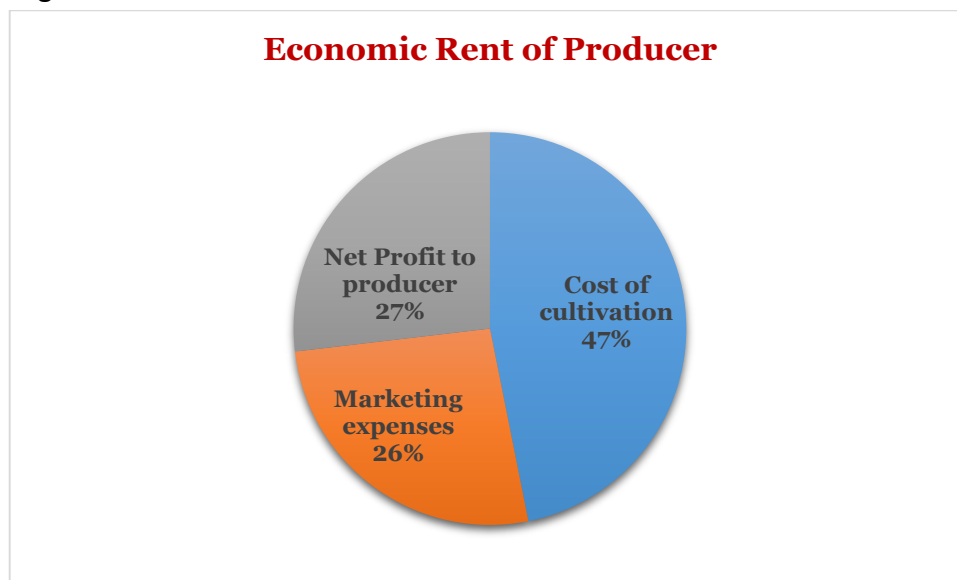
- Processing of tomato is less than 1% in India compared to around 26% in other major tomato producing countries.
- Demand in India for processed tomato products is growing at an annual rate of about 30% and increasing urbanisation and lifestyle changes are slated to grow the demand further.
- Cost of cultivation of tomato depends upon the types of production system (Open or protected) and area of cultivation. Average cost of cultivation is illustrated in Table 9.2

Table 9.2: Average cost of cultivation of tomato crop

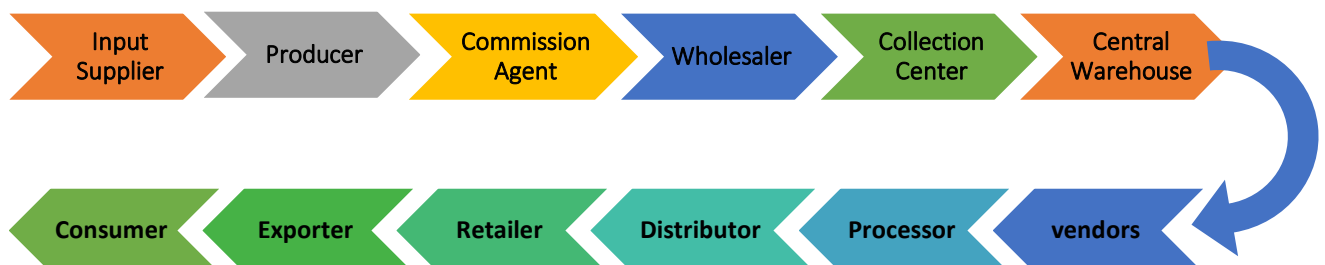
S. No.	Particulars	Amount (Rs.)	Percentage
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1	Cost of seed / planting material	4453	12.91
2	Cost of human labour (Sowing to Harvesting)	15543	45.06
3	Cost of Manure and Fertilizer	6358	18.43
4	Cost of Pesticides & Weedicides	6503	18.85
5	Cost of Irrigation	1138	3.30
6	Cost of Fencing, other support	498	1.45
	Total	34493	100.00

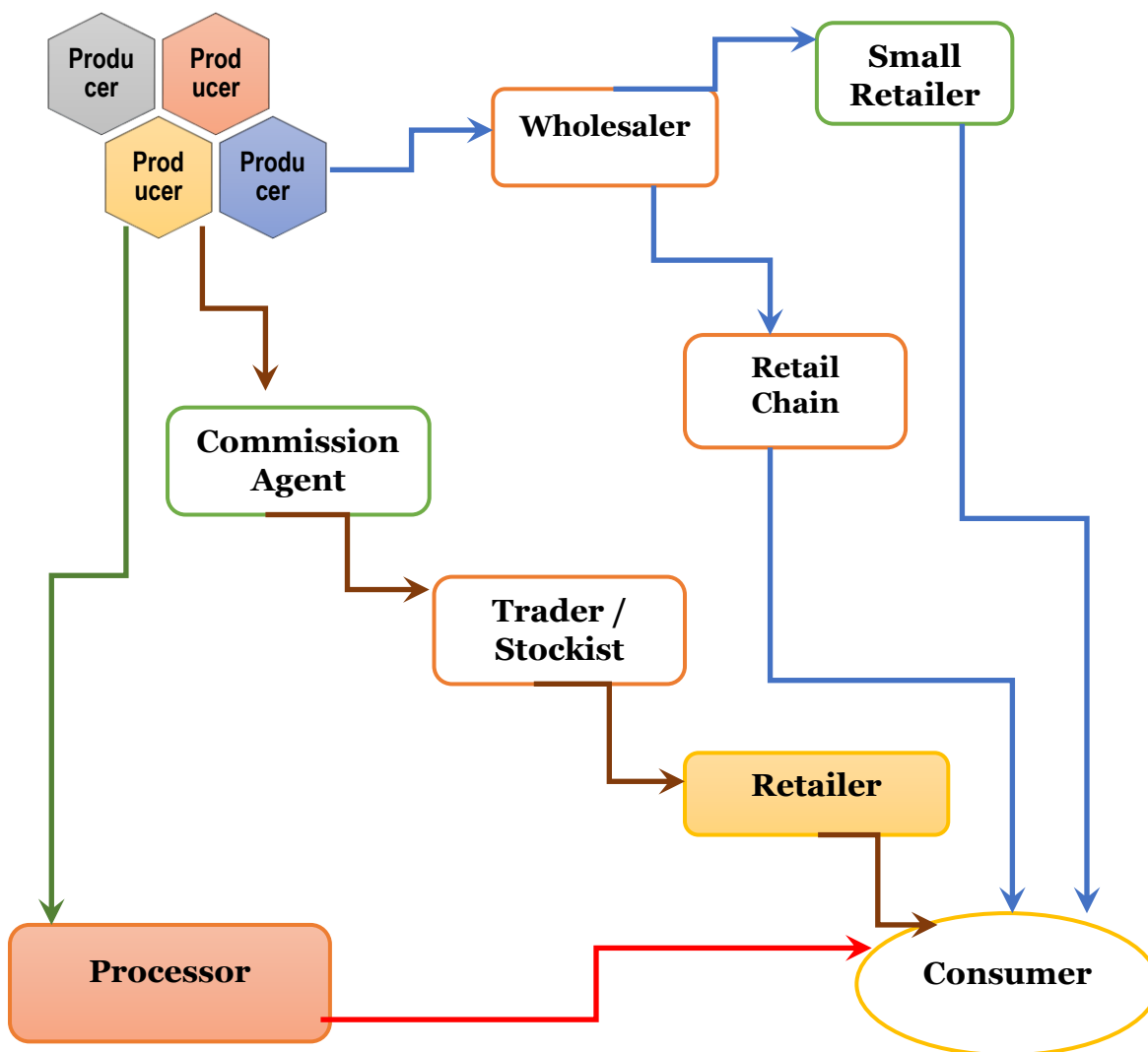
- The Farm gate price is generally within a range from Rs.4,000 to 6,000 per quintal. On the basis of the average prices, the economic rent of the producers is illustrated in Fig 9.1.



9.2 Agri-Value Chain of Tomato



Supply chain of tomato



Cost and Returns in Tomato Value Chain Marketing Systems

The margin for an ownership level is calculated using the value of the buying cost, selling cost, cost of value addition on the date of observation and the loss at that level.

Table 9.3: Distribution of the economic rent among the value chain actors / activities

Value Chain Actor	Value Chain Activities	Activity wise cost (Rs./Kg)	Price Realization (Rs./Kg)
Farmer	Cost of cultivation	2.32	
	Transportation, loading and unloading	0.64	
	Cleaning and grading	0.16	
	Total Losses (During Harvesting, Transportation, Cleaning, Sorting, Grading, Storage and Marketing @10%	0.50	
	Cultivation + Marketing Cost	3.62	
	Producer's Profit		1.34
	Selling Price		4.96
Traders / Commission Agents	Loading and Unloading Charges	0.12	
	Packaging Material Cost	0.15	
	Weighing Charges	0.01	
	Mandi Fee	0.00	
	Wastage during sorting, cleaning & Transportation @ 6.06%	0.30	
	Commission	0.25	
	Marketing Cost for the Trader	0.83	
	Margin (Average 10%)		0.58
	Selling Price		6.36
Wholesaler	Labour Charges (Loading & Unloading)	0.15	
	Packaging Material Cost	0.15	
	Wastage during Sorting, Cleaning & Transportation and weight loss @ 13.5%	0.86	
	Total marketing cost for the wholesaler	1.16	
	Margin (Average 12%)		0.90
	Selling Price		8.42
Local Retailer	Transportation Cost	0.34	
	Loading and Unloading	0.12	
	Loss due to transportation and sorting @ 8.67%	0.73	
	Total marketing cost for the retailer	1.19	
	Margin (Average 20%)		1.92
	Selling Price		11.54

Table 9.4: Value chain actor wise marketing cost and Marketing Margin

Value Chain Actor	Marketing Cost (Rs./Kg)	%	Marketing Margin (Rs./Kg)	%	Economic Rent (Rs./Kg)
Producer	1.30	29.02	1.34	28.27	2.64
Traders / Commission Agents	0.83	18.53	0.58	12.24	1.41
Wholesaler	1.16	25.89	0.90	18.99	2.06
Retailer	1.19	26.56	1.92	40.50	3.11
Total	4.48	100.00	4.74	100.00	9.22
Cost of Cultivation (Rs./Kg)					2.32
Consumer Price (Rs./Kg)					11.54

- The above table indicates that the average cost of cultivation is 20% of the consumer price.
- Total marketing cost of all the value chain actors comes to 39% of the consumer price.
- Total marketing margins of all the value chain actors comes to 41% of the consumer price.
- Out of total market margins, the retailer normally earns the highest market margin of 40.50% followed by the producer (28.27), wholesaler (18.99%) and trader (12.24%).
- There is an opportunity for the integration of the trading business of the wholesaler and trader for the FPOs which will enable the FPO to enhance the market margin to 31.23% which is equivalent to Rs.1.48 per Kg of tomato.
- The business opportunity for a FPO working as a value chain actor (trader and wholesaler/Commission agent) as estimated for 100, 300 and 500 producer members is illustrated in Table 9.5.

Table 9.5: Business opportunities and income to producer through FPO

FPO Size	Area (Ha)	Production Quantity @ 149 q/acre (MT)	Business Participation (Rs. In lakh)		Market Margin (Rs. In lakh)	
			Traders / Commission Agents	Wholesaler	Traders / Commission Agents	Wholesaler
100	85	3103	43.75	63.92	18.00	27.93
300	255	9309	131.26	191.77	53.99	83.78
500	425	15515	218.76	319.61	89.99	139.64

- Similarly there is also a business opportunity for the FPO as an input supplier. An FPO can undertake the aggregation business of all inputs except the irrigation component.
- Aggregation of plantlets, fertilizers, micronutrients, plant protection measures, farm mechanization and stacking material are the major inputs that can be incorporated in input business model.

Conclusions

The Value Chain concept would be new to many FPOs. Gaining clarity on the different actors and the cost and values associated with each layer of a value chain will help an FPO gradually expand its interventions from the two common activities – bulk input purchase and commodity procurement and sales. While it seems attractive to intervene and participate in almost all stages of a value chain for a crop, having a good understanding of the costs and gains, risks and rewards will help an FPO take the most sensible decision given the circumstances. FPOs can organically expand their presence in value chains, making sure that they have the four key elements – information, products, knowledge and money – to support their activities.

It is hoped that the explorations attempted through this Advance Training Module will support FPOs in expanding their presence in Value Chains.



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